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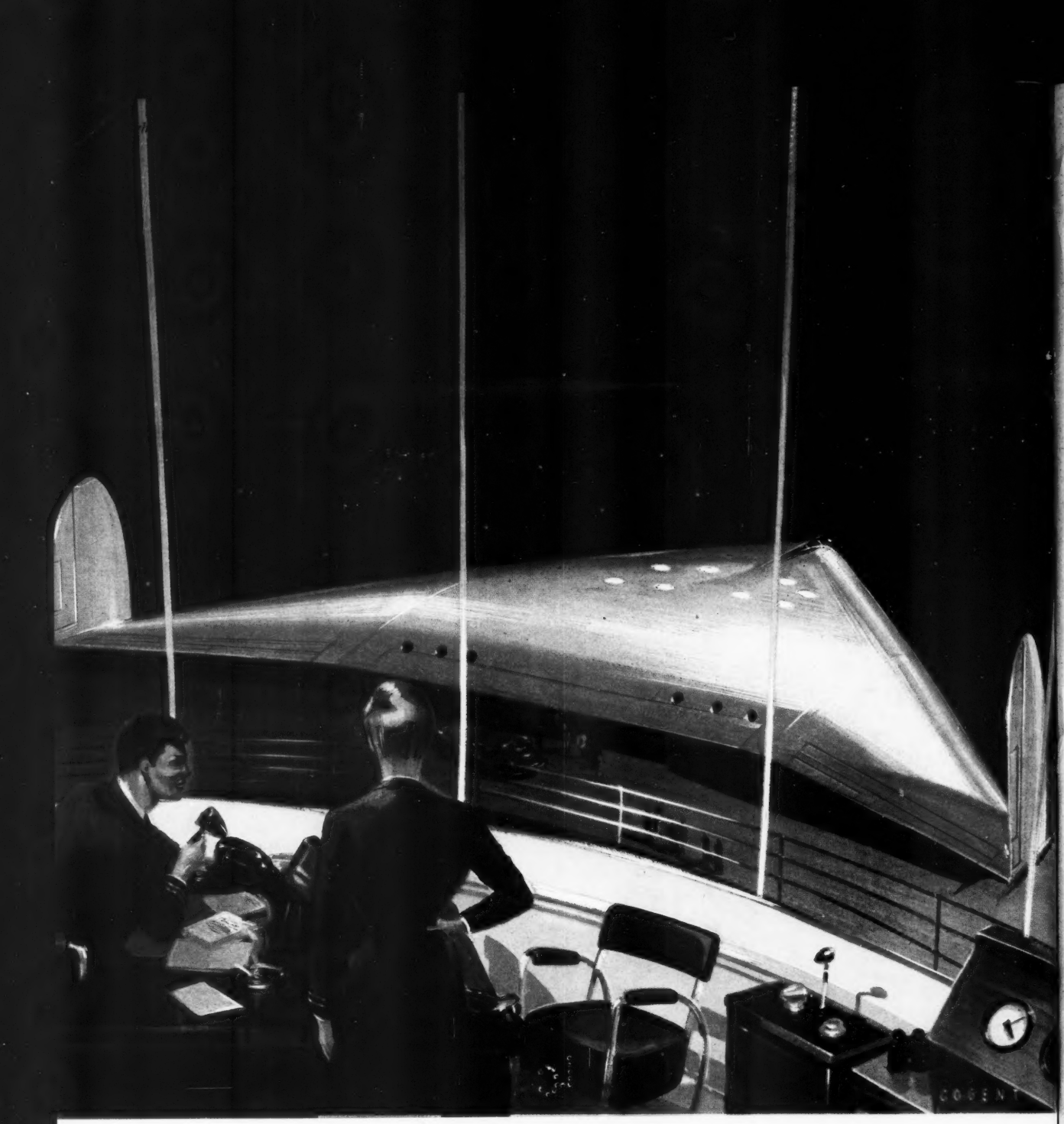

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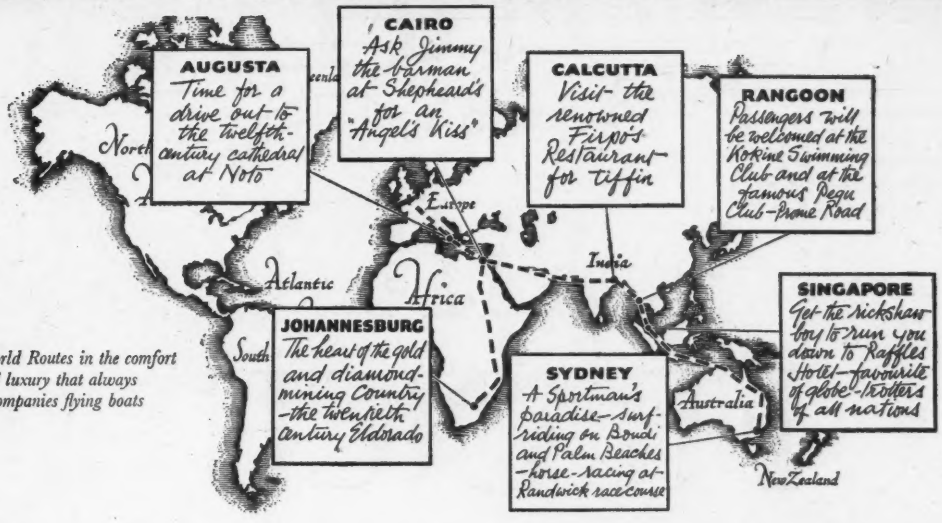
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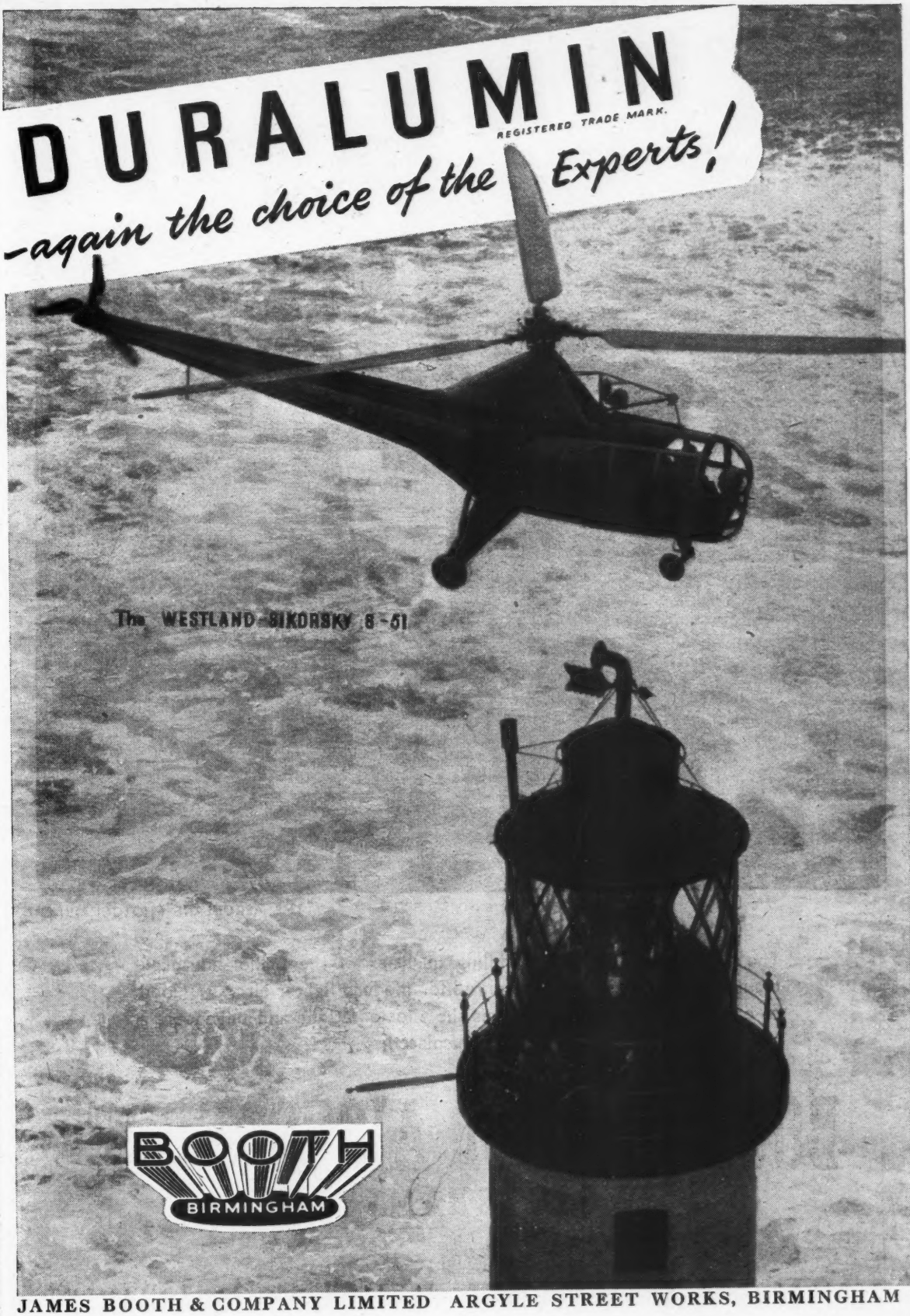

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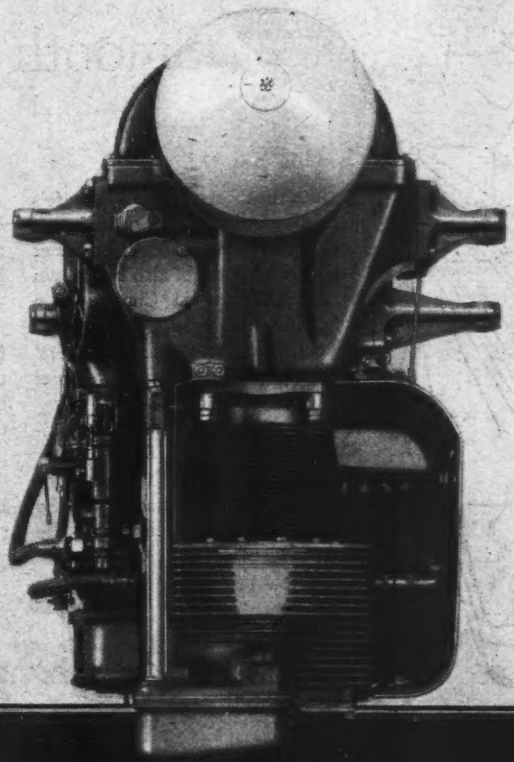

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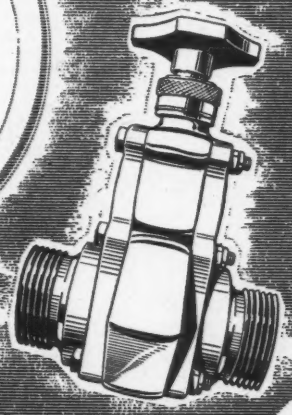

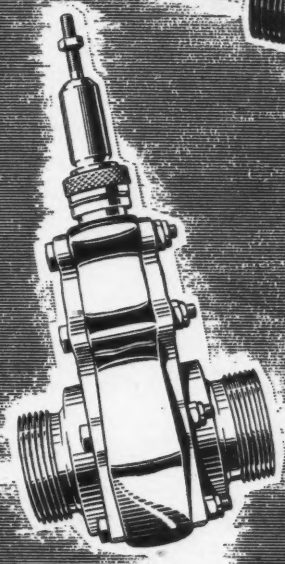

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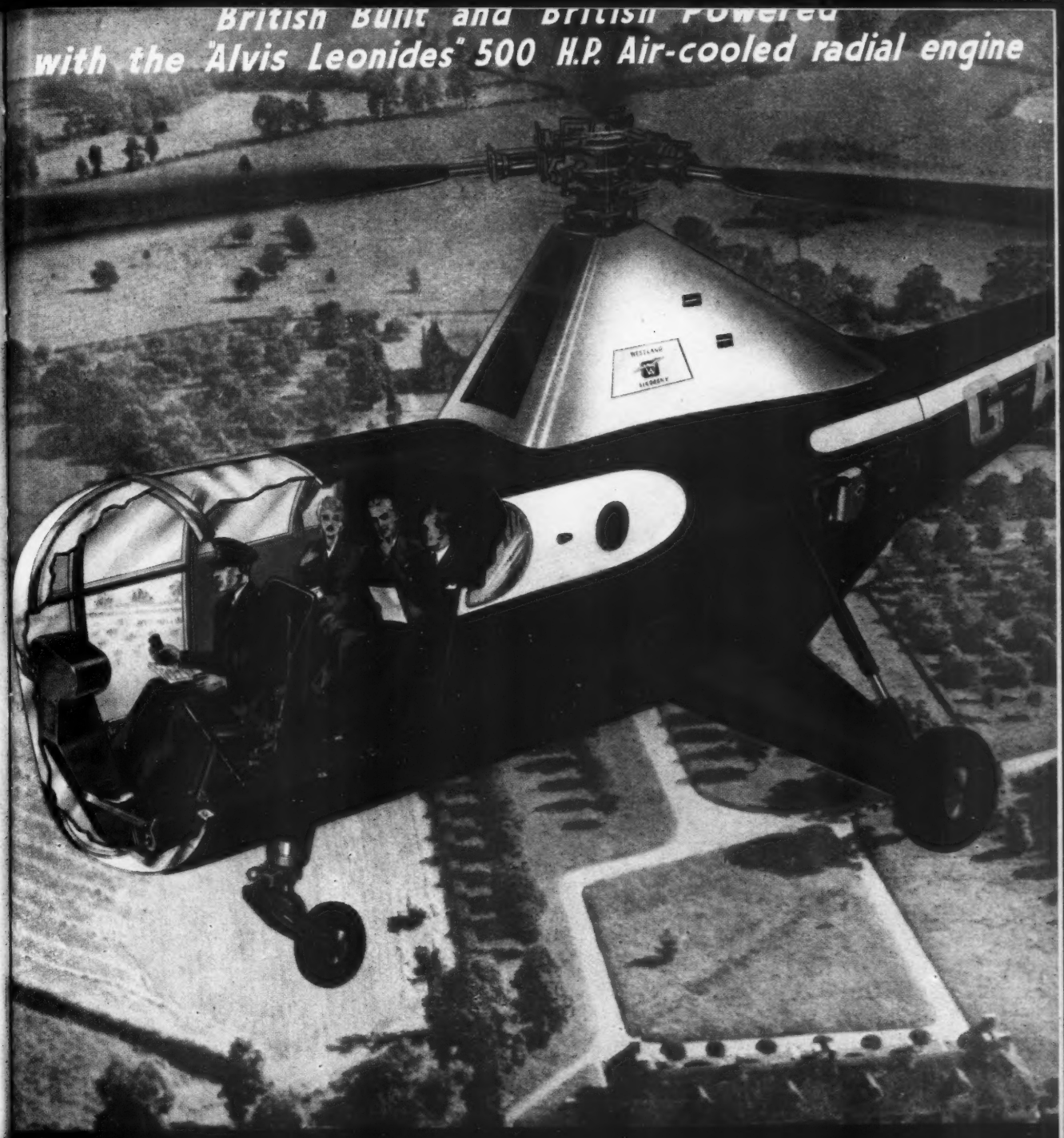

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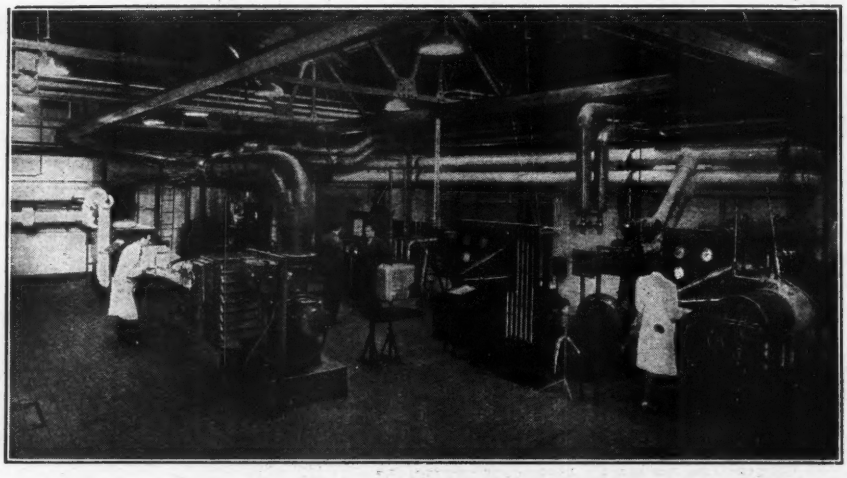

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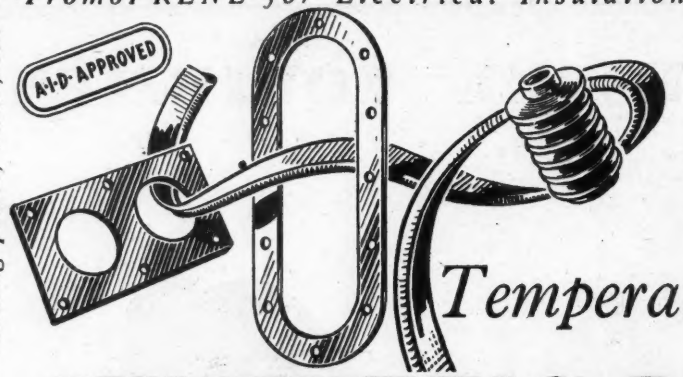

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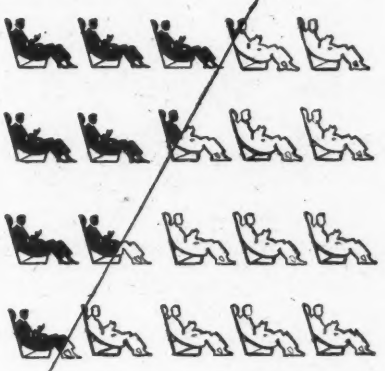

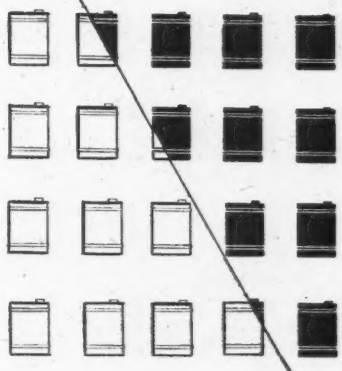

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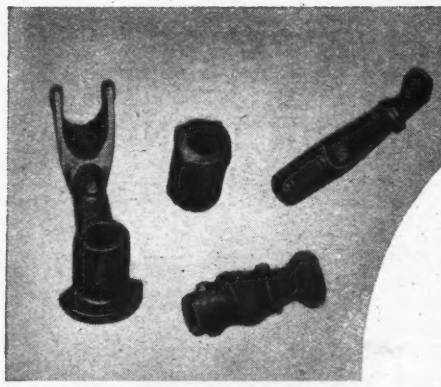

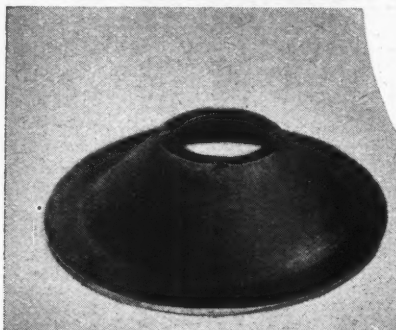

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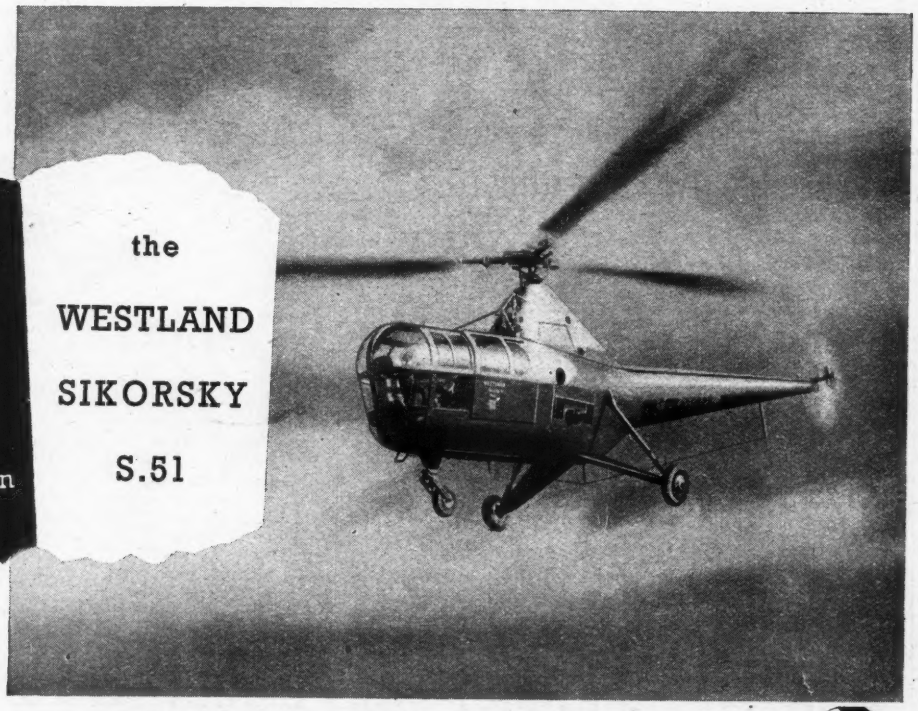

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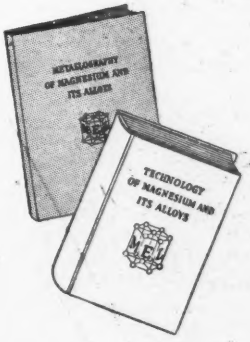

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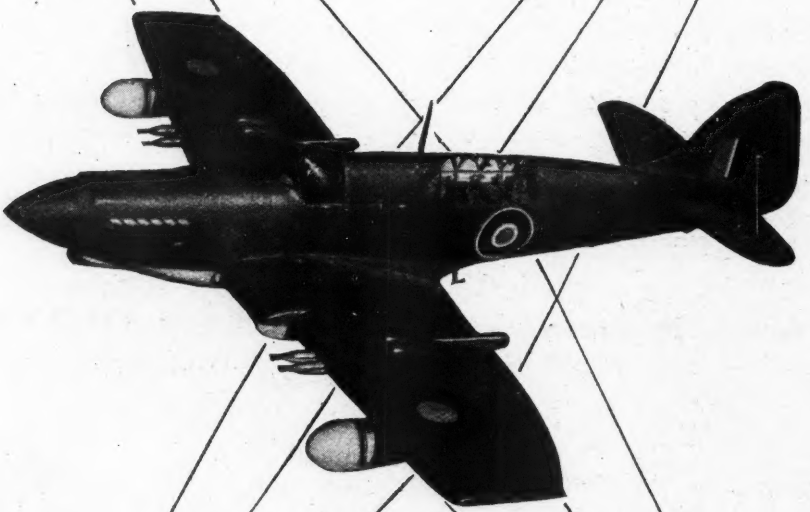

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No. 2049 Vol. LIII April 1st, 1948 Thursdays, One Shilling

The Outlook

Closing the Stable Door

DISSATISFACTION with the meagre amount of information which the Government is willing to give was the feeling that ran through the recent House of Lords debate on defence. Accompanying it was uneasiness about the possibility that the vast sums provided in the Estimates will not be spent to the best possible advantage. As Viscount Bridgeman said, the Estimates are large enough at £962 million, but it is perfectly possible to spend a lot of money and just fail to achieve anything. When the Air Estimates were published in February, we commented that a sum much larger than the £173 million net would have been preferable if one could have the feeling that we are making rapid headway with the reorganization of the R.A.F.

On the question of security, we agree with Viscount Bridgeman that this can be overdone, and that "the fog in this country is much blacker among the people who are entitled to know than it is in the intelligence services of foreign Powers." He went on to elaborate the point by pleading that we should let the people in the Services know where they are, even if this means taking a little chance on security. Unless we do, the Services will not know what to prepare for, and the public will not be convinced that it is necessary to make sacrifices. The late but not lamented Hermann Goering coined the phrase about guns or butter. We do not want the British people to get the idea that they will have neither. Yet that is the impression which all this secrecy tends to create.

Lord Nathan, for the Government, did little towards relieving the feeling of uneasiness, beyond recalling that the Prime Minister "in another place" had promised to consider whether, following on publication of information about the Navy, further information could be given. "In the case of the other two Services," Lord Nathan said, "it has been considered contrary to public interest to make a unilateral disclosure about formation strengths and dispositions." It is to be presumed that the expression unilateral in this connection referred to Russia. Even during the war, when Russia was our ally, any disclosure was entirely unilateral, and we knew little then of her fighting forces and their equipment. There is no reason to believe that the position has changed since the erection of the "iron curtain," but equally there is no reason to assume that Russia is not already very well informed about any defence measures which we may be taking. Certain things must obviously remain closely guarded secrets, but it is rather ridiculous to hide from our own people what a potential enemy could find out with very little trouble anyway.

Mobility

IN his Memorandum to the Air Estimates, the Secretary of State for Air explained that the aim of the Government is a mobile striking force so organized as "to enable a substantial weight of air power to be developed at short notice in any area where it may be required." Such a striking force must include many things besides bombers, an arm in which we are not very well placed for the interim period until new jet-propelled machines come along.

If a striking force is to be mobile, it must have fast transport aircraft. It is good to know that in the Handley Page Hastings the Royal Air Force will have a long-range transport capable of carrying great loads fast over long distances, and that, as this machine is already in production, it should fill one gap in the re-equipment of the R.A.F.

The recent flight of a Hastings from Bassingbourn to Sydney in 46½ hours' flying time is proof that mobility can be achieved. This particular machine is on a proving flight to determine its behaviour in climates hotter than our own, and the fact that it took the England-Australia record away from a Constellation was purely accidental. Stops were made *en route* at several places, and the actual elapsed time was a week. But had there been any urgency, the Hastings could have taken a very

useful military load to Australia in a very short time. The fact that its carrying capacity can cover a variety of loads makes it a very versatile military transport: some seven and a half tons in the form of guns or lorries; or 50 fully equipped troops; or, as an ambulance, 32 stretcher cases, 24 sitting cases, four attendants, and a ton of medical supplies; or as a carrier of paratroops; and as a tug for the largest gliders.

In the House of Lords debate on defence, mentioned above, Lord Nathan stated, referring to the Forces in general and not to the R.A.F. specifically, that "No large-scale re-equipment of the Forces has yet been undertaken. In the view of the Government, this has been neither necessary nor desirable." In the specific case of transports for the R.A.F. we should have thought that re-equipment was both necessary and desirable. It is true that it is difficult to see the shape of things to come so far as the fighting weapons of the Royal Air Force in general are concerned, but if there is one thing which is certain, it is that if the Service is to be truly mobile, it must have fast transports. Even when what Lord Douglas of Kirtleside called "the atom bomb, push-button type of warfare" is reached, fast air transport will surely be needed.

High-speed Sloth

TRIALS with the Vickers transonic models have lapsed and will not be resumed for some months, due, in the words of the M.o.S. Principal Director of Scientific Research (Air), to shortcomings in the rocket motor at great heights. This announcement is made after months of fiddling about, and after the Americans have flown a piloted aircraft, the Bell XS-1, powered with a rocket motor produced by a private company. Further, there are good grounds for believing that the XS-1, has flown at above sonic speed, although official confirmation of this has not been given —perhaps understandably in view of world instability.

Transonic experiments have been made and are being made over the same Scilly area range with winged "dropped bodies" of about 2,000 lb. These have exceeded sonic speed, a reliable measuring technique has been established and we have learned a lot. It has been proved that the thrust required to overcome the enormous increase in drag encountered in the transonic range is of the order of 1 lb for every pound of all-up weight. This means that a turbojet would require to give three to four times the existing thrust without any increase in weight, thus a rocket motor must be used instead for experimental flights at these speeds.

Various advanced designs for very high-speed aircraft are known to exist in this country, but we do not seem to have put to much use the vast mass of German experience with rockets. Britain cannot put a tithe of the American effort into research, either in manpower or in prime cost, but for the efforts we *can* make, the results which have so far emerged seem to be pitifully small.

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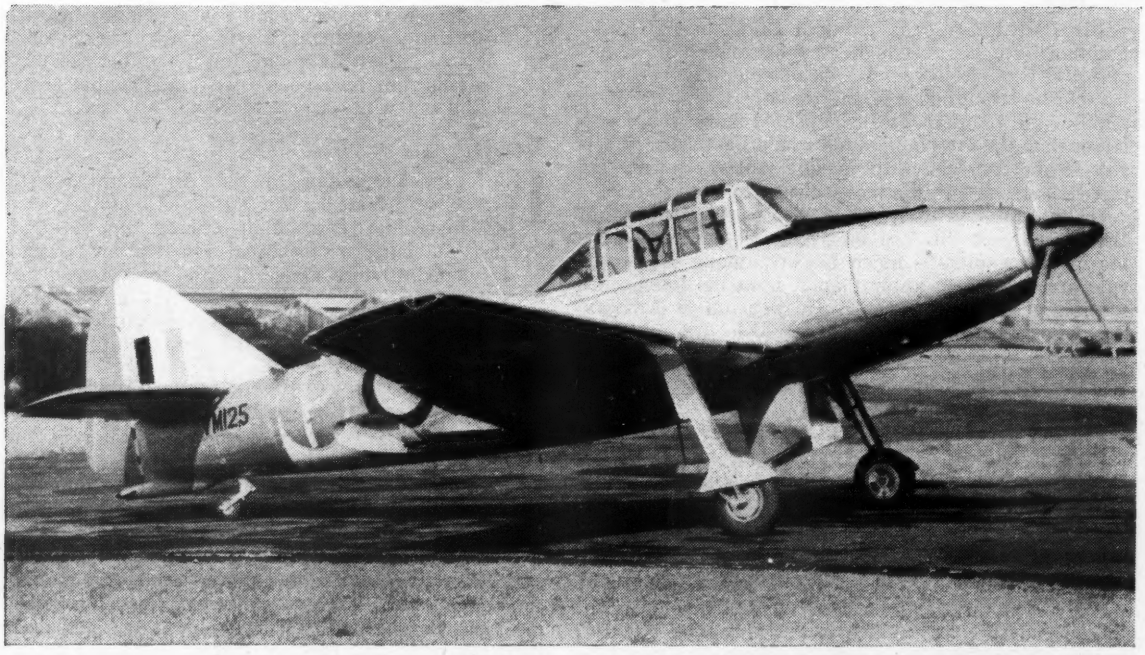
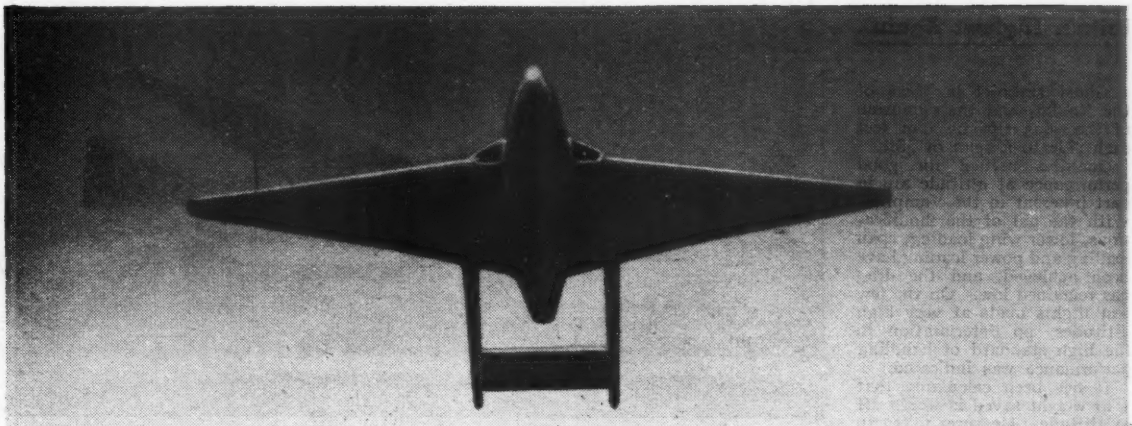


THE COMPLETE TRAINER: Wheeled out for the first time last week, the prototype Avro Athena Mk I with Mamba turbo-airscrew power plant is the forerunner of several similar R.A.F. three-seater advanced trainers, including other Mk I's with Mamba and Dart turbines and a number of Mk II's with Rolls-Royce Merlins. A first flight is to be made as soon as full clearance is given for the engine/airscrew combination. The Athena carries a very full complement of instruments, radio and aids equipment.



BRITAIN HIGHEST AGAIN

With its tapering wings of increased span, the modified altitude Vampire appears to be reaching for the heavens.

Group Capt. John Cunningham Breaks the Altitude Record in a de Havilland Ghost Vampire

ON March 23rd the international altitude record for heavier-than-air machines was regained for this country by de Havilland's chief test pilot, John Cunningham, D.S.O., D.F.C., who reached 59,492ft (18,133m) subject to F.A.I. confirmation, in a modified Vampire fighter. Everyone will wish to congratulate the pilot and the technicians behind the scenes on this fine achievement.

Although the ultimate speed record and perhaps the long-distance record are more impressive to the public than the attainment of very high altitude, the value, or more precisely, the technical efficiency indicated, is certainly no greater, if as great. Sheer speed achieved by a research aircraft provides data, and is of considerable academic interest. Speed over distances, particularly if good manœuvrability and good load-carrying qualities are entailed, is indicative of high military value. Maximum altitude calls for efficiency in many fundamentals; engine, airframe and the human pilot all being very highly taxed.

In this country, the expense in money, material and manpower which would be required to build special record-breaking aircraft would not at present be justified. We have been all the more proud, however, when our standard, or near-standard military aircraft have, since the war, been able to secure such records as maximum speed, speed over 100 km, and now the altitude record.

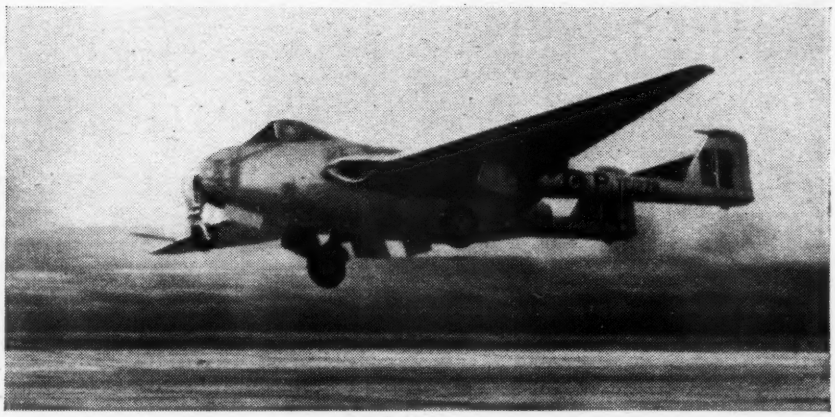
The previous altitude record, which had stood for ten years, was set up by Colonel Mario Pezzi in a Caproni 161 with a height of 56,049ft (17,083 metres). The Italian record has thus been beaten by 3,400ft. Incidentally, the previous British holder was the late F/L. Adam who, on June 30th, 1937, reached 53,937ft in the Bristol 138 monoplane with two-stage-supercharged Pegasus P.E.VIs.

F.A.I. rules require that in order to set up a new International Class C (Avions) record, the standing one must be bettered by at least 500 metres. If at any time a powered aircraft should endeavour to beat the world's altitude record (22,066 metres), which is, of course, open to balloons and other lighter-than-air craft, and is held by Capts. Orvil A. Anderson and Albert W. Stevens, of the U.S.A., it would be necessary to improve on the existing record by two per cent.

The Vampire flown to a height of over 11 miles by John Cunningham, is a modified version of the standard fighter. The main differences are the fitting of

John Cunningham, D.H. chief test pilot, of war-time night-fighter fame, uses a special hook-on step to enter the Ghost Vampire cockpit.

Britain Highest Again .



In spite of its increased span, area and power, the record-breaking Vampire is reported to handle in the same pleasant manner as the standard fighter. Note the metal cockpit hood.

a Ghost turbojet in place of the Goblin, and the extension of the wing tips by four feet each side to a span of 48ft.

Qualities needed for good performance at altitude are in part inherent in the Vampires. With the aid of the modifications, lower wing loading, span loading and power loading have been achieved, and the drag has remained low. On the few test flights made at very high altitudes, no deterioration in the high standard of handling performance was indicated.

It has been calculated that 1 lb weight saved is worth 2ft in altitude. Measures taken to reduce weight include the removal of all paint from the exterior surfaces, the fitting of smaller batteries in the place usually occupied by ballast, and the removal of radio and armament. The take-off weight with 202 gallons of fuel, sufficient for one hour's endurance, is 8,400 lb.

Cockpit alterations include the fitting of a metal canopy, special cockpit heater, and ten emergency compressed-air bottles. Eight of these are stowed in the radio compartment and two in the ballast compartment. The cockpit is pressurized from the main engine compressor up to a differential pressure of rather more than 2½ lb/sq in, which gives the pilot an equivalent height of 37,000ft at 60,000ft. John Cunningham is able to fly at this pressure without discomfort, provided he watches his diet and, preferably, flies early in the day. "Porridge for breakfast, beer or new bread, are to be avoided," he says. An interesting fact regarding flight at this height is that, due to the absence of all dust particles there is nothing to diffuse the sun's rays, the sky is black, and, therefore, the cockpit is in deep shadow unless in direct light.

As he carried no radio or navigational equipment, Cunningham made a practice during his several flights of climbing on a straight course just enough out of the sun for visual comfort. This took him almost to Portsmouth by the time he had reached 42,000ft on the record flight. He then turned on a reciprocal course, reaching ceiling just north of Hatfield. The view from great heights has been rather disappointing due to cloud, but on one occasion he had a very fine panorama of almost the entire south coast laid out below him.

Thin Air and Turbine Temperature

For the engine, the critical feature is the turbine temperature. The standard air intakes are employed, even though the jet unit is more powerful and the air extremely thin at the altitude. The Ghost, which is one of the experimental units in use for the D.H.106 development programme, is rated at 4,400 lb thrust at 10,000 r.p.m. As height increases and less air enters the compressor, the jetpipe temperature goes up for a given engine speed, and the fuel supply must be progressively reduced to maintain a suitable mixture ratio. Combustion efficiency becomes progressively more difficult to achieve. To cater for the very small flow at 50,000 feet and over, a special high-pressure atomizer has been fitted together with an additional burner pressure gauge.

A measure to keep down the turbine temperature is the fitment of a slightly larger jet nozzle, designed to suit operation at the greatest altitude and providing for the simultaneous attainment of the maximum permissible jet-pipe temperature (over 700 deg. C) and engine speed. Four small air scoops around the Ghost nacelle help with engine and accessory cooling.

One problem which has had to be solved in connection with the new altitude record is the actual measurement of the height. At 60,000ft and over this is no simple matter, particularly as the rules require accuracy of measurement to within plus or minus one per cent. On the special Vampire a small automatic observer, a modified version of the standard equipment, has been installed in the gun compartment. This records on a cinefilm: (a) the pressure altitude on a normal altimeter; (b) the indicated air temperature; and (c) the indicated air speed. The air temperature recorded is indicated because it is dependent upon speed, compression in the instrument giving an artificial temperature rise. Recordings taken at frequent intervals of the temperature and pressure provide the information required to determine the true height. (a), (b) and (c) above give the true air temperature; (a) and corrected (c) give a true pressure altitude at any level on the climb up to maximum altitude and on the descent.

Rate of Climb

The aircraft is capable of a maximum rate of climb of about 8,000 ft/min, but somewhere between 3,500 and 4,000 ft/min was used on the record in order to avoid the risk of lag on instrument readings. John Cunningham selected a rate of descent to suit his own comfort, and a few recordings were taken because the rules require him to "prove that he landed afterwards." The fact that the Vampire is capable of a very high rate of climb had no significance in the record flight, but it is noteworthy that the value from a military point of view of a rapid climb to approximately 55,000ft is very great. The record flight was of only 47 min duration.

It is reported that stability at altitude is good and that the machine has been flown hands-off at the ceiling. Naturally it is sensitive fore and aft, but a comparatively low wing loading has prevented the trim becoming critical. At 60,000ft there is an indicated air-speed range of 125-155 m.p.h., and this improves rapidly with decrease in altitude. Variation of engine speed does not have a startling effect on aerodynamic characteristics; for example, there is no tendency to stray suddenly and without warning into compressibility troubles or a stall if thrust is altered, and the rate of climb or glide is not unduly critical. To give a reasonable rate of descent without running into compressibility, however, the dive brakes must be used. So far as landing and take-off are concerned, John Cunningham says that there is no real difference between this machine and the standard Vampire.

Although the important part of an altitude attempt takes place above the tropopause (36,090ft)—the official commencement level of theoretical constant temperature—weather can have quite an appreciable effect on the altitude which can be attained. As mentioned previously, the cooling of the turbine and of the engine generally is one of the limiting factors, and, therefore, cold air high up is good because its density increases the mass-flow of air in the engine. The colder the air, in fact, the higher the pressure altitude permitted. From the other point of view, hot air low down is good for the record. There is no lack of power from the engine, so the hot air at low density gives a high pressure altitude, high, that is, by comparison with the "tape line" or measured altitude. Ideal weather conditions are thus hot air below the tropopause and as cold as possible above it. Experimental high-altitude flights with the Vampire will continue.

EASTER SUNDAY AT THE LANCASHIRE CLUB

ON the afternoon of Easter Sunday a successful flying meeting was held at Barton airfield, Manchester, the headquarters of the Lancashire Aero Club. Of eleven entries to compete for the Pemberton Trophy, Mr. K. Moff, who gained twenty out of thirty marks, was successful, and second was Mr. B. W. Borr with 16½ marks. There were six competitors for the Rodman Trophy, but only one qualified, Mr. P. R. Jefferies, who gained 17½ marks. These landing contests were judged on style, point of landing and landing run, ten marks being awarded for each section. Mr. N. McCarrol, Elliots' chief engineer, took the Newbury Eon prototype to Barton.

The Meteor VII Trainer (right) is prepared for test at Moreton Valence. At the left of the picture S/L. Zurakowski is leaving the cockpit of a standard Meteor IV fighter.

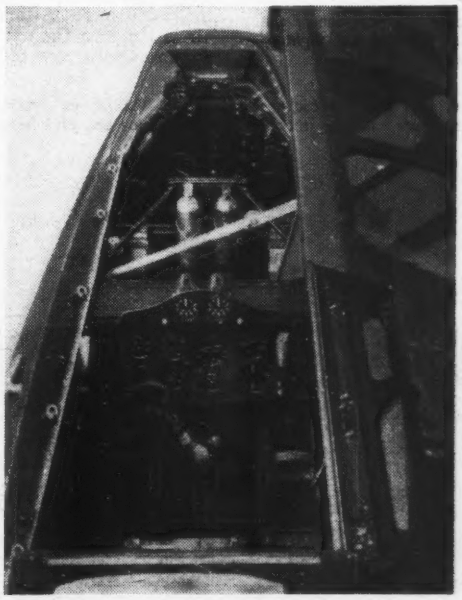
METEOR MISCELLANY

Initial Trials of Mk VII Trainer : Recent Fighter Developments

[Illustrated By "Flight" Photographs.]

EVIDENTLY the Gloster Meteor will prove itself to be one of those altogether exceptional aircraft which, being so sound in basic design, offer unusual possibilities of development and lend themselves to a remarkable variety of applications. Already known as a record-breaker, interceptor-fighter and ground-attack or reconnaissance aircraft, the Meteor has been further utilized in various branches of high-speed research and even fitted with a deck-wire arrester hook. Now comes a version which, being unique in its class, and having such a wealth of experience behind it, seems assured of an especially successful career. Known as the Meteor Trainer, or in R.A.F. terminology as the Meteor T Mk VII, the new model is intended to bridge the fast-widening gap between the piston-engined—or more strictly airscrew-driven — advanced trainers, and modern jet-propelled aircraft.

The first flight of the Mk VII prototype, lately inspected by *Flight*, was made on March 19th with "Bill" Waterton as the "pilot-instructor" and Mr. Rodney Dryland as "pupil-pilot." The machine was flown from the strip at Brockworth and landed at Moreton Valence, Gloster's main test airfield. Airborne for twenty-six minutes, the Trainer was subjected to general handling, stability and trim tests, and the field of view from the new hood was assessed. Flight characteristics proved to be almost identical with those of the long-nosed Mk IV fighter, but as the all-up weight is less, the rate of climb is even more spectacular, and has been estimated to be 7,920ft/min at sea level. Although he has not yet flown the machine at its limiting Mach Number of 0.82, Waterton has attained a true air speed of 520 m.p.h.—about 65 m.p.h. below the estimated maximum speed. He reports that the view from the rear cockpit is surprisingly good, considering the limitations imposed by the hood (especially with "a little co-operation" from the man in the front seat) and that it is comparable with, and possibly slightly better than, that from a Harvard.



The double cockpit of the dual-control Meteor VII prototype. In this particular machine the instructor, in the rear seat, has fewer instruments than the pupil.

One of the most attractive features of the Trainer is the retention of all basic Mk IV airframe components, except the forward fuselage and canopy. The wings, fuselage and tail of the prototype, which is registered G-AKPK, are, in fact, those of the erstwhile Meteor demonstrator.

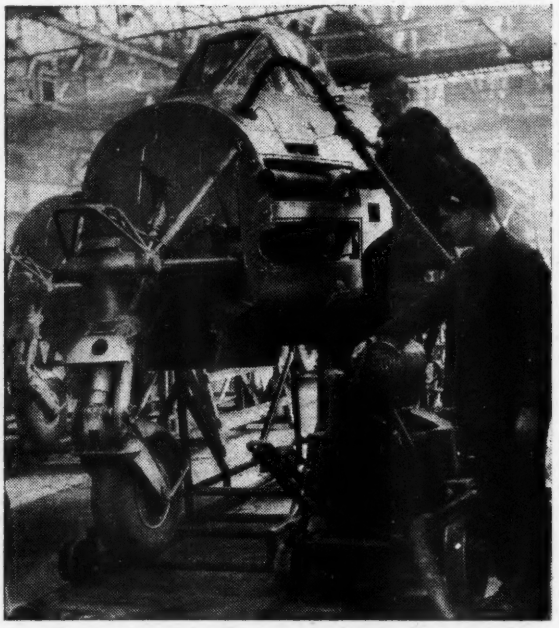
The jettisonable hood is of massive construction and hinges to starboard. A blown "clear-vision" canopy would, of course,

Meteor Miscellany . . . . .

have been preferred, but the stresses imposed by flight at 585 m.p.h. are too severe for an enclosure of this sort. On the first prototype, the pupil's cockpit is provided with an artificial horizon, altimeter, turn and bank indicator, rate of climb indicator, air speed indicator, and direction indicator, and the following engine instruments are installed: jet pipe temperature gauge, r.p.m. indicators, fuel contents gauge, brake pressure gauge, flap indicator, undercarriage indicator, machmeter and compass. In the rear cockpit, all these instruments are duplicated except the jet pipe temperature gauge, brake pressure gauge, undercarriage indicator, compass, and fuel contents gauge. Customers' requirements—such as the provision of full engine instruments in both cockpits—can, of course, be considered.

Though the Mk VII specification does not call for a pressure cabin or armament it might fairly be argued that the full value of such an aircraft can only be realized if these features are incorporated. For present British requirements, however, a camera gun and gyro gunsight are considered sufficient.

"Bill" Waterton (right) with Mr. Rodney Dryland, one of the Gloster test pilots, who acted as "pupil" on the first flight of the Meteor Trainer.

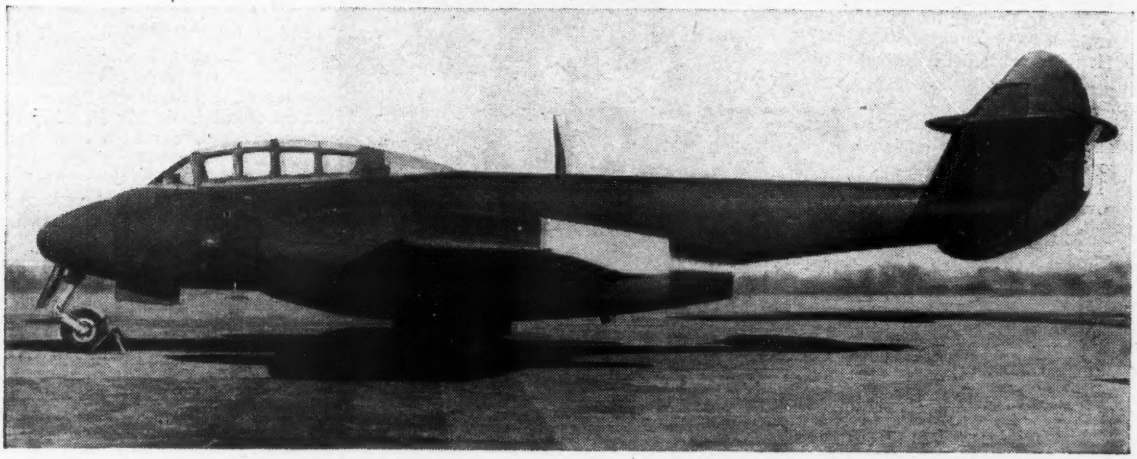


Pressure-testing the sealed cockpit of a Meteor IV fighter on the production line at Brockworth.

Standard Mk IV Meteor fighters now coming off the line have a pressure cabin of the sealed-structure type, which is tested by pressurizing to 3 lb/sq in and noting the time taken for the cabin pressure to drop to 1½ lb/sq in. This must not be less than 1 min 45 sec. The sealing medium is Peratrol, which is not harmed by oil or hydraulic fluid.

Heated air is supplied under pressure from the compressor casings of the Derwents. Below 7,000ft the system supplies heating only, the pressure cabin control valve automatically preventing pressure from being built up; above that height, however, the air performs its full dual function. A pipe from each Derwent runs along the front spar, the two pipes joining at a duplex non-return valve. Should the supply from one compressor fail, the corresponding inlet is closed, and the "dead" system sealed off. From the valve a pipe runs to a shut-off valve and thence to a constant-flow valve, both mounted in the magazine bay. After leaving the constant-flow valve the air is led into the cabin, the delivery pipe terminating in a spray at the base of the windscreen. Beneath the pilot's

It will be seen in the side view below that the new cockpit enclosure of the Meteor Trainer—here incompletely painted—is of fine aerodynamic contour. The length of the fuselage nose can also be appreciated.



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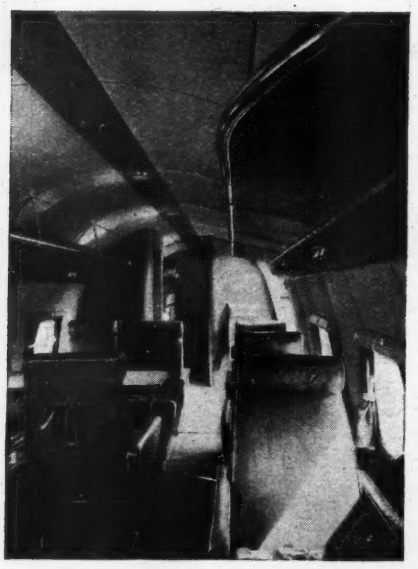

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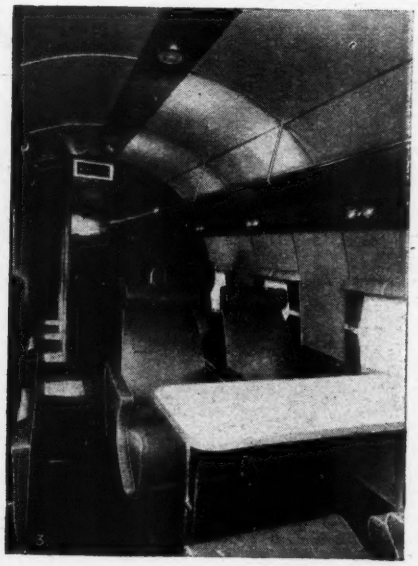
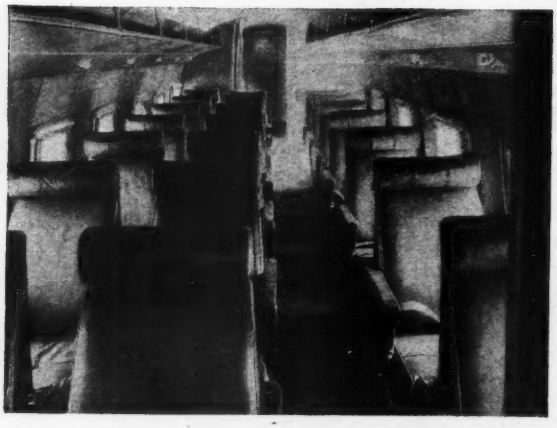
Many conversions, for example, have been carried out in co-operation with Messrs. Airwork Limited in this country, and Messrs. Fokker in Holland.





1. RUMBOLD Executive model looking aft towards buffet and toilet.
2. RUMBOLD Standard 21-seater conversion.
3. RUMBOLD Executive model looking forward towards sleeping cabin.

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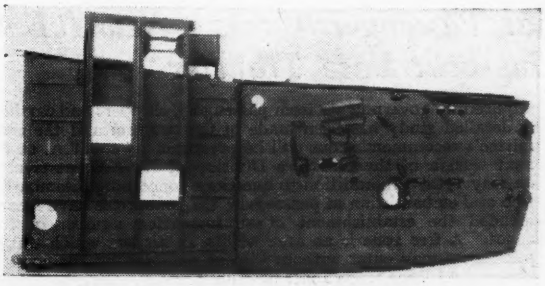
Meteor Miscellany . . . . .

seat is the Normalair pressure cabin control valve which by regulating the rate at which the air escapes, governs the cabin pressure.

An inflatable rubber gasket seals the sliding hood, the gasket being held against the edges of the hood by a casting attached to the windscreen arch, the hood sills and the seat bulkhead, and being inflated by air from the cabin pressure pipe at a branch pipe after the constant-flow valve.

In the nose of the fuselage is an intake for cold ventilating air, and, on the port side of the cockpit, an extractor valve for stale air. The control handle for the pressure and heating systems has three positions—"Cold" (vent and extractor valves open, shut-off valve closed); "Hot" (vent and extractor valves partially shut, shut-off valve opened sufficiently to admit some hot air); and "Pressure" (ventilating system closed and shut-off valve fully open). At the last setting pressurizing starts automatically at 7,000ft, and the full pressure differential of 3 lb/sq in is attained at 24,000ft.

In addition to being pressurized, the standard Mk IVs are fully "tropicalized" and have, in addition to their four 20mm guns, fittings for two 1,000 lb bombs or eight 90 lb rocket projectiles. The extra thirty inches of fuselage length in the latest version permits elimination of several hundred pounds of ballast, and allows for an extra fuel tank of 100-120 gallons. This tank supplements the main fuselage tankage of 325 gallons and a ventral drop tank of 180 gallons. The fighter version can, moreover, be fitted with wing drop tanks of 100 gallons each.

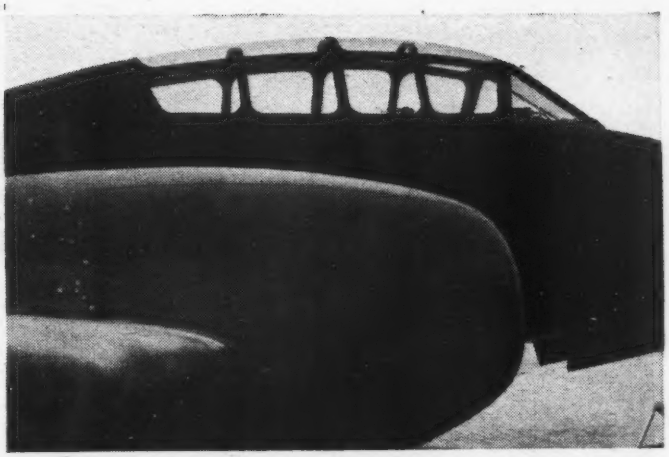


A comparison of the front fuselage side panel of a standard Meteor IV (above) and that of the Meteor VII trainer, showing the greater length of the latter.

Moreton Valence always provides plenty of interest, and on a summery day last week the pilots were fully occupied on production testing and development flying. S/L. Waterton is now assisted in this work by Messrs. J. Zurakowski, Rodney Dryland and J. M. Cooksey. Having seen "Zura" disappear into the blue from all-out level flight, we were prompted to ask how many turns of an upward roll the Meteor could complete in a zoom. He thought perhaps six—certainly five. Possibly Farnborough will supply an answer in September this year.

The latest information from the Gloster technical office shows that the Meteor IV has a rate of roll at 5,000ft, with a force of 60 lb on the control column, of 100 degrees per second.

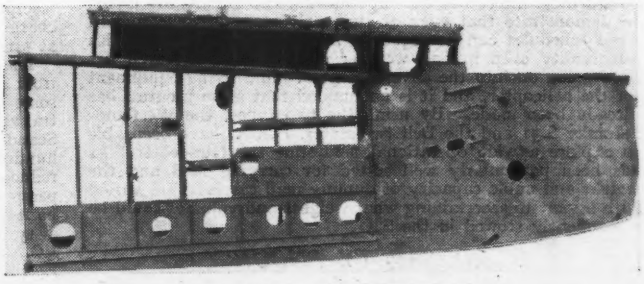
Squadron Leader J. Zurakowski, ex-Boscombe Down pilot, is one of the Gloster test team.



The contour, attachment and operation of the enclosure over the Trainer's tandem seats has been the subject of deep study.

GLOSTER METEOR T. MK VII TRAINER
Two Rolls-Royce Derwent V Turbojets
(Provisional Specification)

Dimensions	
Span	37ft 2in
Length	43ft 6in
Aspect ratio	3.9
Weights	
Tare weight	10,290lb
Removable equipment	118lb
Pilot and pupil, with equipment	447lb
Fuel (325 gall)	2,633lb
Oil (5½ gall)	50lb
Ballast	462lb
All-up weight (without drop tank)	14,000lb
All-up weight (with drop tank)	15,750lb
Performance	
Max. speed at s.l. (no drop tank)	585 m.p.h.
Max. speed at 20,000ft (no drop tank)	565 m.p.h.
Max. cruising speed (no drop tank) at 20,000ft	535 m.p.h.
Rate of climb at s.l. (no drop tank)	7,920 ft/min
Rate of climb at 20,000ft (no drop tank)	4,820 ft/min
Absolute ceiling (no drop tank)	48,500ft
Max. range (with drop tank)	820 miles



S.L.A.E. BRAINS TRUST

OVER 100 people attended the "Brains Trust" meeting of the Society of Licensed Aircraft Engineers held in conjunction with the A.R.B. and the M.C.A. at the Mansion House, on March 20th. The Brains Trust was composed of six members of the A.R.B., Mr. R. E. Hardingham, O.B.E., being in the Chair and Mr. F. F. H. Boxal represented the M.C.A. Besides numerous written questions the Brains Trust answered supplementary and impromptu questions from the audience. In reply to a request to state the reasons for the recent grounding of Tudor airliners, Mr. Hardingham pointed out that the decision was ministerial and although the A.R.B. had no evidence to justify the suspension of the type's C. of A., it had been taken as a precautionary measure. After investigations by the R.A.E. had failed to find any cause to withdraw it, the C. of A. had been passed for re-issue. There were numerous questions on the duties of L.A.E.s concerning automatic pilots and the Brains Trust replied that regulations defining those duties were being considered and compiled and, until they were issued, the overriding requirement—that an auto-pilot shall not affect the manual operation of the flight controls—was considered adequate to cover all cases at present.

CIVIL AVIATION NEWS

DEVELOPMENT PROGRESS: The next stage in Ambassador development will be single-engine take-off trials, in all probability at Beaulieu. Mr. George Errington is at present in America obtaining airline experience. He hopes to fly Constellations and possibly the Martin 2-0-2. Static pressurization trials have been started on the second prototype Ambassador.

I.A.T.A. to Recommend International Passenger Cards : New B.E.A. London Terminal : Flying-boat Base Transfer

PROGRESS WITH HELICOPTERS

DURING the past three months the B.E.A. Helicopter Experimental Unit has been flying over a 120-mile circuit in Somerset and Devon, and since familiarization was the first requirement the initial stages consisted of flying non-stop around the circuit. The first phase was followed by a five-week period making scheduled landings at villages, and a regularity factor of 96 per cent was achieved in spite of adverse weather in February. In the final phase the G.P.O. co-operated with dummy mail services from village post offices to the adjacent landing ground. The Post Office has shown considerable interest in the experiments, and B.E.A. are trying to demonstrate that even at this early stage of development fixed schedules can be regularly maintained in daylight with punctuality even in bad weather conditions. Research has been going on into the development of blind flying equipment for the helicopter, and it is understood that some progress has already been made. By using the two types, the Westland-Sikorsky S.51 and the Bell two-seater, B.E.A. have been able to explore a wide operational field, but the four-seater S.51 has been particularly well suited for carrying mail and the weight and cubic capacity of dummy mail carried were varied with a view to ascertaining what weights and volumes could be conveniently stowed in the S.51.

I.C.A.O. SAFETY ENQUIRY

EACH member state of the International Civil Aviation Organization has been asked to review existing air navigation regulations and practices to determine the reasons for accidents. The council has asked for detailed information on recent precautions which have been taken to ensure that aircraft clear high ground with safety, and of measures taken to establish procedures for checking the accuracy of altimeter settings. Information is also required on the progress made in the determination of ceiling and visibility minima for take-off, approaches and landings and the requirements for adequate fuel reserves. Members have been asked to check the accuracy and adequacy of spot heights over obstructions shown on aeronautical charts, particularly along airways and in the vicinity of airfields. The results of the investigation are required by May 1st, after which the council will consider them and decide whether further action by I.C.A.O. will improve safety on international flights.

TOWARDS FEWER DOCUMENTS

WITH Mr. H. H. Galbraith in the chair, the Government Forms Sub-committee of the International Air Transport Association met in London during the week ended March 20th. The Sub-committee's aim has been to reduce and to standardize the number of formalities, forms, visas, stamp fees, and stamps required by governments from passengers, shippers and carriers. A detailed study has been made of the problem and the committee's recommendations will be presented by I.A.T.A. at the next session of the Facilities Division of I.C.A.O. at Geneva on May 17th. In addition to questions concerning disembarkation and embarkation of passengers, the committee have recommended the establishment of an increasing number of free zones. A free zone is an area within an airport which transit passengers may enter without visa or passport for the country concerned. Free trade zones are similar areas which have been established at airports in order that merchandise may be brought into the country for manufacture or for repacking and reshipping, without being subject to customs examination charges or duties. The only customs-free zone in the world is at present established at Shannon airport.

The number of forms at present required by governments from shippers, passengers and carriers is excessive, but already some reduction has been achieved in the U.K., the U.S., Central and South America, Australia, New Zealand, Hong Kong, Scandinavia, Belgium and part of India, where more than one hundred and thirty carrier forms have been eliminated and reduced to four more simple documents. Instead of the normal passport for passengers, an International Passenger Card is to be recommended, and if possible it is hoped to introduce such a system in some countries about four months after the I.C.A.O. meeting at Geneva. The United States already have legislation drafted for the State Department to make bilateral agreements with other countries for the abolition of visas. It is known that visas are comparatively ineffective in the U.S.A., and it is thought that the international travel card will be introduced. A single form has also been planned for the use of private fliers to cover the requirements of the Home Office, Customs, Health, Post Office and Police. There will also be a standard International Cargo Invoice on which the minimum amount of information will be required in the simplest form.

TUDOR TRIALS

FOLLOWING a preliminary report from the Air Safety Board, the Minister of Civil Aviation has agreed that the Tudor IVs may be used forthwith by B.S.A.A. as freighters but not at present for passenger services. Until current trials on range and consumption are completed the Tudor IVs will not fly between the Azores and Bermuda. It is understood that B.S.A.A. will use the aircraft on the North Atlantic route through Shannon and Gander to Bermuda.

The Tudor I aircraft embodying the modifications suggested by B.O.A.C. returned on March 18th from the trial flight to the Ministry of Supply's tropical testing station at Khartoum and to Nairobi. The flight, carrying observers from the A.R.B., the Ministry of Supply, B.O.A.C., and Messrs. A. V. Roe and

Rolls-Royce, was undertaken to ascertain whether the C. of A. should be granted, and although there has been no official statement, it is understood that it was successful. The flight, however, represents only a portion of the tests, and further trial tests, which are being conducted at Boscombe Down, are necessary before the full results can be made known.

KENSINGTON AIR STATION

WITH effect from May 31st B.E.A.'s new town terminal, from which all coaches for B.E.A. services will operate, will be at Stafford Court, 108, High Street, Kensington, and will be known as Kensington Air Station. From the same date the booking and enquiry offices, now at Airways Terminal and the Channel Islands Unit in the Victoria Coach Station block, will be at Dorland Hall, Lower Regent Street. These offices will be open to the public from 8 a.m. to 8 p.m. on weekdays, and there will be a 24-hour service for reservation by telephone throughout the week, including Sundays.

U.K.-CUBAN AGREEMENT

A BILATERAL agreement providing for the reciprocal grant of facilities in each others territories for the operation of scheduled air services has been signed between the United Kingdom and Cuba. This agreement, which is based on the principles of the Anglo-American agreement concluded at Bermuda on February 11th, 1946, covers the operation of services by the designated airlines of the two countries between Europe and Central America, and those connecting Cuba with neighbouring British colonies, and will come into force as soon as it has been ratified by the respective governments.

ACCIDENT OFF SHANKLIN

INEXPERT and dangerous low-flying has been given as the cause of an accident to an Auster which occurred off Shanklin beach, I.o.W., on August 29th last. The pilot of the aircraft, Mr. R. W. Bacon, and his two passengers, Mrs. S. Wilson and Miss J. A. Hall, lost their lives. After flying over Shanklin pier and performing a number of badly executed gliding and climbing turns the aircraft, from a height of about 250 feet, descended in an engine-assisted glide. At a height of approximately 150 feet the pilot dived towards a speed boat on the water, and at 100 feet increased the steepness of his glide to a very steep angle. At about 40 feet the machine started to recover, but there was insufficient height available and the aircraft struck the water at an angle of 60 degrees and plunged below the surface. In his report on this crash the Chief Inspector of Accidents refers to Mr. Bacon's habit of low flying over the sea in the close vicinity of shipping against which he had been warned on more than one occasion but with little effect. He had been slow to learn to fly and had exhibited over-confidence; he was not an experienced pilot. The aircraft, its loading and documents were in order at the time of the accident which, it is said, was caused by errors of judgment and airmanship on the part of the pilot.

B.O.A.C. LEAVE POOLE

CONSEQUENT on the move of the B.O.A.C. flying-boat base from Poole to Southampton on April 1st this year, it is understood that a certain proportion of M.C.A. personnel at present employed at Poole will become redundant. Those affected are members of the Marine Craft Unit, which consists of fire-floats, air traffic control launches, and patrol craft engaged in the clearance of flotsam and jetsam. With the move to Southampton, and as part of the economy drive, the Ministry of Civil Aviation have decided that these craft should be manned by B.O.A.C. staff, and a number of dismissal notices, understood to be in the neighbourhood of 50, are being issued.

AIR FRANCE FACILITIES

TO break journey and spend up to fifteen days in Paris is a facility to be allowed to Air France passengers travelling to the capital for connections on long-distance flights. This facility, previously available only on certain routes, has been extended to cover practically all the company's services, and is now available to Air France passengers proceeding to the Far East, South America, Africa and the United States from almost any part of Europe. Passengers wishing to avail themselves of the facility must state the proposed length of stay in Paris at the time the through ticket is issued for the long-distance flight, in order that subsequent bookings can be arranged. A similar "stop-over" facility in Lisbon exists for passengers travelling between Casablanca and Bordeaux via Lisbon.

BREVITIES

Air lines are now running between Moscow and Khabarovsk and Moscow-Yakutsk. A passenger service has also been opened linking Moscow with Novosibirsk, Irkutsk and Krasnoyarsk.

* * *

The new edition of the "U.K. Air Pilot," which is in course of production, will provide information on aeronautical facilities, regulations and ground organization. It will be presented in loose leaf form comprising four parts: General Information, Meteorology, Telecommunications and Aerodromes.

* * *

Following two increases in schedules, on April 18th and May 31st, B.E.A. will be offering some 3,400 Viking seats each week in both directions between Britain and the Continent. This is an increase of nearly 50 per cent over last year.

* * *

One hundred radio mechanics are needed by the Ministry of Civil Aviation to maintain the transmitters, receivers and other equipment installed throughout the country for communication and navigational - aid purposes. Radio mechanics Grade I will start at £5 15s.

* * *

The British Gliding Association has reported satisfactory initial progress in raising funds for the British team to compete in the International (not Instructional as was misprinted in *Flight*, March 18th) Gliding Contests in Switzerland this summer. Contributions should be addressed to the Secretary, B.G.A., Londonderry House, 19, Park Lane, W.1. The first Gull IV practice aircraft has been delivered.

Mr. Whitney Straight, chief executive of B.O.A.C., left London on March 20th by air for America. His visit, which is expected to last ten days, is being made to discuss problems of joint interest with the heads of the principal American air lines.

* * *

On and after May 31st Air France will no longer use Airways Terminal, Buckingham Palace Road, as their departure and arrival station. Instead all coaches for Air France services will use the new Kensington Air Station at 108, High Street, Kensington.

* * *

B.E.A. non-stop scheduled services between London and Oslo will commence on April 18th. The service will operate

"Flight" photograph.

***60 SECONDS:** Transferring mail from a G.P.O. van into a waiting B.E.A. helicopter. In the current dummy-mail trials the aircraft is scheduled to remain on the ground for only one minute.*

Civil Aviation News . . . . .

with Vikings three times a week. Aircraft will leave Northolt at 09.21, arriving at Gardemoen, Oslo, at 13.21. The homeward service will leave at 14.30 and arrive at Northolt at 18.46.

* * *

Between April and December, 1947, B.O.A.C.'s Atlantic Division carried 22,549 revenue passengers on the Corporation's routes from New York and Montreal to London and between Baltimore and Bermuda. In the same period 576,624 lb of mail and diplomatic mail were carried on these routes together with 351,571 lb of air freight.

* * *

A.V-M. W. B. Callaway.

Air Vice-Marshal W. B. Callaway, Divisional Controller of the South-Western Division of the M.C.A., and Captain B. L. Huskisson, R.N. (Retd.), Divisional Controller of the Northern Division, has each taken up his duties at headquarters in Bristol and Liverpool respectively.

* * *

The formal investigation into the loss of the *Star Tiger* will be opened as a public court at 10.30 a.m. on Monday, April 12th, at the Hoare Memorial Hall, Church House, Westminster. Lord Macmillan, G.C.V.O., has been appointed by the Minister of Civil Aviation to be in charge of the investigation.

Capt. B. L. Huskisson.

* * *

From March 2nd onwards Trans World Airlines have included a stop at Basra on their weekly New York-Bombay route. These flights are scheduled to leave New York on Tuesdays at 10 a.m. arriving at Basra on Thursdays at 5.45 p.m. The route is via Gander, the Azores, Lisbon, Madrid, Algiers, Tunis, Cairo, Dhahran and Bombay.

Printed time-tables for the Air France summer schedules will be available shortly containing details of connections to Corsica and North Africa and of new services to Milan and Spain. All summer services will connect with Glasgow and Manchester.

* * *

Mr. Wayne Parrish in *American Aviation* recently made the interesting observation that the big danger for airlines was the constant growth of bureaucracy. "To-day," he said, "there is one C.A.A. employee for every 5.9 airplanes." The British Ministry of Civil Aviation plan ultimately to employ 11,000 and the British corporations fly approximately 200 aircraft.

* * *

Notice to Airmen No. 106 draws attention to the need for strict radio discipline to be observed by other aircraft in the vicinity of a machine transmitting distress signals. A summary of the action to be taken by an aircraft intercepting a distress signal, as laid down by the International Telecommunications Union and I.C.A.O., is contained in this Notice.

* * *

During the week ended March 13th Pan American delivered over one million air mail letters to overseas destinations. This represents an increase of about 100 per cent over the average weekly load of a year ago. The major portion of this mail was destined to Prague, the aerial gateway to Poland, Russia and the Balkans.

* * *

The findings of Dr. Daniel Horn, of the U.S. Air Force Medical Branch, and the recommendation that pilots surviving a serious accident should be grounded for a year, are disputed by the Airline Pilots' Association, whose President, Mr. David Behncke, characterizes the proposal as ridiculous and one which the Association will fight with every power at its disposal.

* * *

An Air Safety Board report published recently in Washington states that many accidents were found to be due to faulty engineering which had passed unnoticed by the designers. It recommended 35 structural changes in aircraft to eliminate mechanical failures, and called for standardization of cockpits, installation of emergency exits, use of non-inflammable helium gas, and improvements in fireproofing and firefighting equipment.

FROM THE CLUBS

THE Gloucester Flying Club's Air Display and Garden Party will be held on Saturday, July 3rd.

* * *

More than 300 people attended the opening of the Hereford Aero Club at their new premises at the Tudor Café, Commercial Street, Hereford, on March 10th. The Mayor of Hereford, a former member of the R.A.F., was among those present to launch the club. The subscription has been reduced to £1 1s per annum with no entrance fee. Efforts are being made to secure sufficient support for a V.R. Squadron at Hereford airfield and also to form a gliding club to operate at this field. During the summer the club will endeavour to find a method of reducing the tuition costs from the present £3 5s per hour. The parent company, Aircraft Hereford, Ltd., will make charter arrangements to convey parties to the Three Counties Show, to be held in June at Staverton, Glos, and it may be possible to fly race-goers to Hereford race-course, adjacent to the Hereford airfield.

* * *

Unfortunately, the Landing Competitions for the Rodman and Pemberton Trophies which the Lancashire Aero Club had arranged for February 28th had to be abandoned on account of very bad visibility on that day; it was therefore arranged to hold them on Easter Sunday, beginning at 2.30 p.m., weather permitting. It was also arranged that the Newbury Eon should be available for demonstration to pilot members. Membership of the club has been increasing very satisfactorily and 15 new flying members have been elected during the last month or so; five aircraft are now serviceable. A. A. Orsi and B. W. Boor both completed their first solo flights on March 14th. Parachutes are now provided for use with the Tiger Moth, and the rate for this aircraft has therefore been raised to £3 2s per hour; the rate for the Austers is £3 per hour. Pilots who do ten hours' flying in their licence year get a reduction for any further flying until the licence expires of 10s per hour. There is also a rate of £4 per day, in which case the member pays for petrol, oil and any other incidental expenses. During the summer it is proposed to organize Sunday morning cross-country flights to neighbouring clubs at Blackpool, Yeadon, Derby and Wolverhampton. Ordinary members may take part as passengers and each aircraft will carry its full load.

The Cowes Aero Club's annual Ball at Newport on March 12th was a well attended and highly successful social event. With improved weather dual and solo flying are again in full swing and the membership is increasing daily.

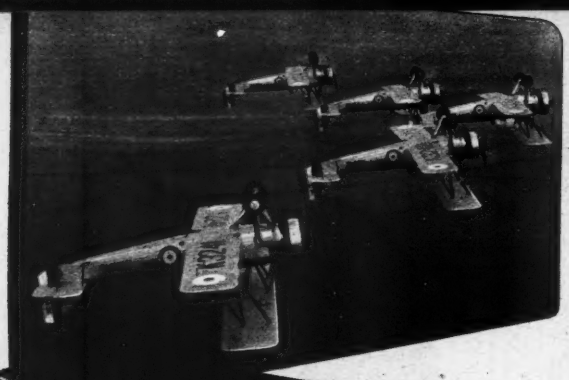
* * *

A dance was held on Easter Saturday at the South Coast Flying Club, which is now endeavouring to extend its social activities to include badminton and deck tennis. Facilities for these games will be available to members at a nominal charge to cover the cost of replacing the equipment. A course of lectures began on March 23rd and will be held every Tuesday, Wednesday and Thursday; the subjects to be covered include general airmanship, elementary meteorology, navigation and theory of flight. There is no charge for admission and interested friends may accompany members to these talks.

* * *

On March 18th Mr. A. Townsley, chairman of the City of Portsmouth branch of the Air League of the British Empire welcomed a gathering of supporting donor firms and friends, together with members of the local branch, at the Portsmouth Aero Club. The occasion was to meet the three selected nominees who are to receive Assisted Pilot Training under the scheme organized by the Portsmouth Branch of the League. The names of these nominees are: Mr. T. Randall, Mr. J. L. Barnes and Mr. D. Bambury. After particularly welcoming G/C. W. N. Cumming, a member of the executive committee, the chairman proceeded to give a short history of the formation of the local branch and its activities. It was due, he said, to the suggestion of the local committee that the Assisted Pilot Training Scheme came into being, and Airspeeds, Vospers, and the Portsmouth Aero Club had presented cheques to help start the venture. In thanking these donors the chairman expressed the hope that these three nominees would do justice to themselves and to the scheme, for the support of which a fund was open and contributions to this would be welcomed and acknowledged in the press; these should be sent to the Secretary of the Portsmouth Branch of the League. G/C. Cumming, representing Headquarters, added his congratulations and encouragement to the three nominees and praised the Portsmouth branch for its achievement in encouraging airmindedness.

de Havilland Dove—on all counts the most suitable aircraft yet produced for executive travel



No. 5 *Flight, April 1st, 1948*

Do you remember?

After the '504' came the Avro Tutor. Here is a photograph of the classic exhibition of upside-down flying by instructors of the Central Flying School at the R.A.F. displays of unforgettable memory.

and now the Avro Athena trainer

Chosen in 1932 after long and fierce competition, the Avro Tutor was a standard trainer until the War days. Now comes the Avro Athena, built to Air Ministry specification, with the Avro trainer's tradition behind it and all Avro's experience of thirty-five years in this specialised field.

A. V. ROE & CO. LIMITED
(Branch of Hawker

AVRO

MANCHESTER
Siddeley Aircraft Co. Ltd.)

A196

WESTLAND-SIKORSKY S-51

Anglo-American Rotating-Wing Effort : British Built U.S. Design with British Engine

LOOKING back is no bad thing, for despite what happened to Mrs. Lot those who look back and survey the past may be vouchsafed some preparation for what to expect in the future; not perhaps in physical shape but at least in the maintenance of a tradition or creed. Taking a brief glance back over the past three decades of Westland history, one can pick out such names as the Dreadnought postal monoplane, the Pterodactyls, the C.O.W.-gun fighter, the F7/30 four-gun shaft-drive fighter, and the Lysander, Whirlwind and Welkin. All these were aircraft which exemplified a good deal of forward thinking, and this is a quality which Westlands have had as an inherent part of their make-up ever since the firm's inception. And it is as a result of this attitude that the company decided to build under licence the Sikorsky S-51 helicopter.

Rotary-wing aircraft are not novelties at Yeovil. In 1934 the C-29 Autogiro was built there in conjunction with the late Señor Juan de la Cierva, and this was followed by the CL-20 which provided an advanced degree of comfort in a neat two-seat side-by-side cabin, and exemplified, perhaps, the most refined state to which the Autogiro was developed. The war, however, ended its career, as it did that of so many things.

With the business of war over, Westlands once more devoted their thoughts to rotary-winged flight and came to the conclusion that their best course lay in undertaking the construction of an already proven design. The Sikorsky S-51 was the only available type capable of any real degree of commercial operation, and thus they made this aircraft their choice.

We take no inconsiderable pleasure in being able to record that the relationship between the United Aircraft Corporation and Westlands has been extremely cordial. So much so, in fact, that if the spirit in which these negotiations have been conducted were to pervade the field of international politics, the present miasma of world troubles would evaporate like morning mists.

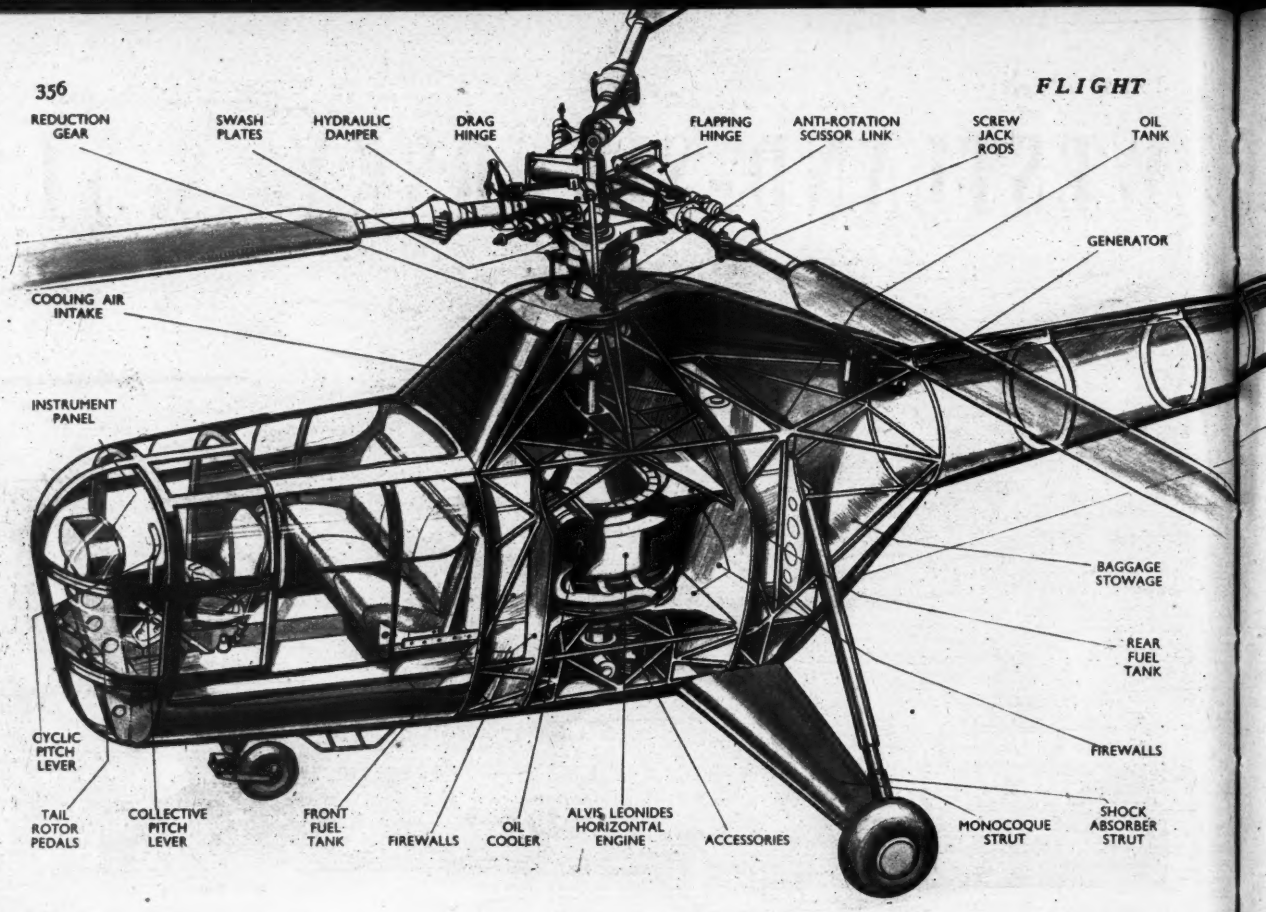
The English S-51, which will have the joint surname of Westland - Sikorsky, will differ from the American original only in minor detail, that is, with the exception of the engine. Further, as full reciprocity is implicit in the agreement between the two companes, any design advances made in this country will be given to United Aircraft, and any American developments will likewise be forwarded to Westlands.

Detail changes in the English production are a result chiefly of the incompatibility of material specifications. To substitute our own specifications for the American has not, however, entailed any penalty on the score of weight or strength, although it has, of course, necessitated the structure being check-stressed.

To avoid having to re-execute all the working drawings supplied from America, some 2,700 in number, these have been subjected to careful review, and any design details necessitating alteration according to British materials and accessories have been incorporated in addendum sheets; each of these is then attached to its appropriate drawing and issued to the shops. This scheme is working well, and no difficulty is experienced by the British workmen in reading drawings employing American projection.

In common with the production versions of the Bristol 171, a description of which appeared in the October 30th, 1947, issue of *Flight*, the Westland-Sikorsky will employ an Alvis Leonides 500 b.h.p. horizontally mounted helicopter power unit in place of the American Pratt and Whitney R985B4 engine. This change will give the S-51 an increase of 50 b.h.p., which is no small advantage.

Before going on to appraise the machine, we might conveniently at this point pause to review the salient features of the Leonides helicopter engine. It is, of course, fundamentally an orthodox air-cooled radial engine, but in fitting it for operation, when installed with its shaft axis vertical, detail modifications have been necessitated. Two main



WESTLAND-SIKORSKY S-51...

problems have been (a) the efficiency of the lubrication system with the engine operating horizontally, and (b) the ease of removal from the aircraft for periodic overhaul. These conditions have been met successfully.

The oil sump has been removed from between cylinders 5 and 6, and instead mounted on the rear cover. All the cylinder heads are inter-connected with drain pipes, and the oil scavenge system has been adapted for efficient draining. An example of this is the supercharger casing, which has been re-designed with a smaller number of diffuser vanes, each incorporating drain holes. The ancillary casing, which carries drives for the vacuum pump, hydraulic pump, r.p.m. generator, starter and oil pump, has also been re-designed to provide all drives with oil-seal protection, and to allow for the running of the gears permanently submerged in oil.

A reversing and reducing gear of 0.8 : 1 is incorporated in the top cover in place of the usual 0.625 or 0.5 : 1 airscrew reduction gear, and the transmission shaft is detachable close to the engine. Air intake to the engine is pressure-fed from below the fan, the entry being situated in such a position that automatic air cleaning is provided. Dirt or other foreign matter is flung outward toward the cowling by centrifugal force so that air entering the intake is always clean.

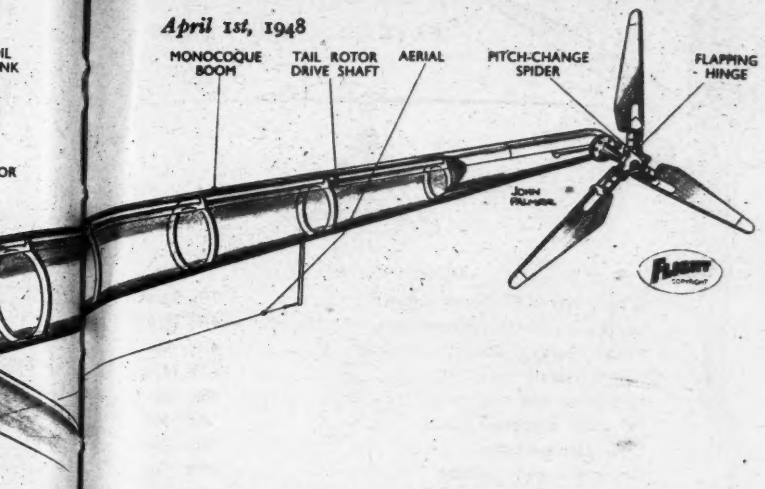
An innovation in helicopter power-plant installations is provided with the Leonides by the standard inclusion of a Graviner fire-fighting system. All feed pipes are flexible and fireproof, and the engine fully meets both A.R.B. and M.o.S. requirements in this respect. The mounting of the engine is of dynafocal type and support pads mounted on the cylinder heads carry the cowling.

The engine compartment is bounded fore and aft by firewalls, on the other sides of which are carried the fuel tanks, each of these providing a capacity of 41.6 Imp. gall. A third firewall immediately forward of the front fuel tank forms the rear bulkhead of the cabin, and above this is arranged a shuttered intake aperture for cooling air. Two further (horizontal) firewalls are arranged, one above the engine at fan level and with a circular aperture for passage of the cooling air, whilst the lower firewall is placed mainly below the exhaust manifold and is so arranged that all engine-driven accessories are beneath it. From the drawing it can be seen that the engine nestles in the heart of a braced structure of welded steel tubes which grow together at the head to form the pylon for the main rotor. Behind the rear fuel tank is the oil tank (8¼ Imp. gall), the tail of the braced body structure being given over to baggage stowage. The oil cooler is mounted to port above the engine on the rear of the intermediate firewall.

Monocoque Undercarriage Struts

In the same lateral plane as the rear fuel tank the main undercarriage projects abeam, and it is of unusual structural form in that the lower members are akin to miniature monocoque "wings." The Turner oleo-pneumatic shock-absorber, which is of Anson type, is carried at the base of the tubular radius strut. Wheels and tyres will be supplied jointly by Dunlops and Goodyears. The nosewheel is carried in a lever-motion fork anchored with its shock-absorber in a cone mounting. This latter is peripherally bolted to the underside of the fuselage, the conic form of the "leg" serving equally to distribute ground-manœuvring and landing loads.

The fuselage nose is given over wholly to the cabin, the glazing and side panelling being carried in a rigid framework supported on the monocoque bath-type structure which forms the floor. From the pilot's seat in the centre of the nose the field of view is so extensive as to give one the feeling almost of nakedness. Indeed, obstruction



This impression by "Flight" artist John Palmer gives an excellent idea of the salient features of the S-51. The cabin is remarkable both for its roominess and for the generous fenestration; the engine compartment is totally enclosed by firewalls, and baggage stowage space is provided in the fuselage afterbody. Details of the main rotor-head mechanism to amplify those shown by the drawing are discernible in the photograph at top right. The star-plate beneath the blade-links provides a droop-stop, and withdrawal of one blade attachment pin allows the blade to be folded and so economize in hangar space. Tail rotor blades are mounted in flapping hinges but do not employ drag articulation. The pitch-change spider and its drag-links to the blade root extension members are clearly illustrated in the detail view, as are the small counterweights on the blade shanks. Taken through the passengers' door the photograph at lower right shows the instrument pedestal of an American-built S-51. The British versions will, however, differ here only in details: the broad aspect will not be changed. Ahead of the pilot's seat can be seen the cyclic pitch control lever, the control of collective pitch being vested in the upward sloping lever to the left of the seat.
"Flight" photographs.

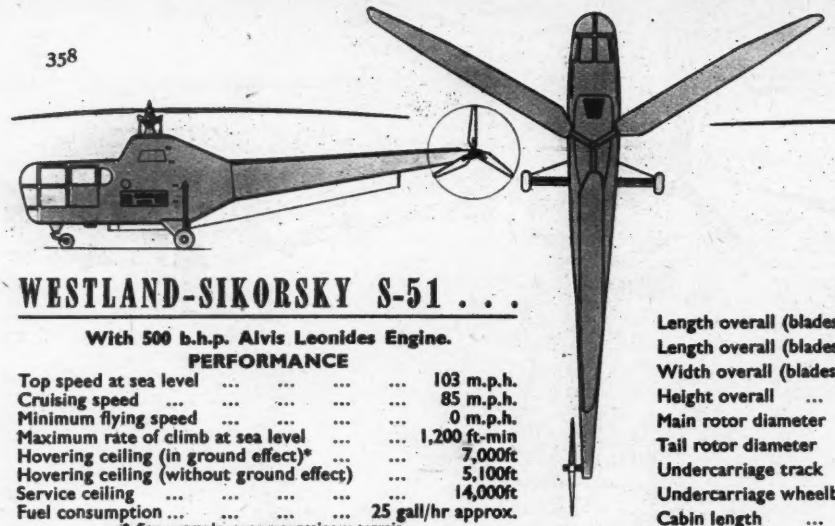
to view is offered chiefly by the instrument pedestal placed squarely ahead of the seat. It is, nevertheless, difficult to see how this could well be reduced in size, for there are no inessentials, and space is not wasted in the grouping.

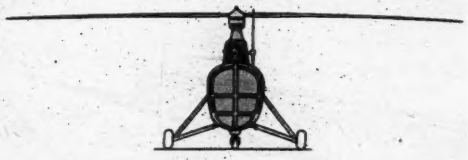
Instrumentation comprises: altimeter, compass, A.S.I., cyl.-head temp., oil pressure and temp., rate of climb, manifold pressure, combined rotor and engine tachometer, ammeter, clock, and fuel contents gauge. Beneath these indicators is space for the radio control panel beneath which, in turn, is the main switch panel. Standard versions of the Westland-Sikorsky S-51 will have single-channel V.H.F. with switchbox and holders for microphone and headset, all mounted on the port wall of the cockpit. Where more extensive radio equipment is fitted, controls will be on the pedestal as mentioned. The main switch panel is flanked by the Arens tension-lock controls for the rotor brake and wheel brakes, and the base of the pedestal houses the controls for cooling-air intake shutters and fuel cut-off. Carburettor heating will not be used with the Leonides engine as a Hobson injection-type carburettor is employed. Mixture control is also automatic.

Entry to the cabin is afforded by sliding doors, the pilot's seat being reached from the starboard side, whilst the bench-type seat for three passengers is served by the port door. Comfort is provided by the Buoyant Upholstery Co., the seats being covered in a soft woollen fabric of good appearance.

The layout of primary controls is in accordance with what has become conventional helicopter practice, that is to say, the cyclic pitch lever is in the normal central "stick" position; the collective-pitch control lever slopes up from the floor to the pilot's left hand; and the tail-rotor pitch is governed by "rudder" pedals. Engine power is governed by interconnection with the collective pitch lever, but a twist-grip at the head of the lever allows fine adjustment of power selections to be made. The run of controls is housed beneath a central trunk along the cabin floor, and removable covers allow secondary collective and cyclic pitch control levers to be fitted so that dual control can be provided. For this purpose the three-place bench seat at the rear is supplanted by a single central seat.

Control transmission is by cable along the floor trunk, and up the rear bulkhead to actuate torsion shafts driving screw-jacks. The jack rods project upward to the lower member of the rotor swash-





WESTLAND-SIKORSKY S-51 . . .

With 500 b.h.p. Alvis Leonides Engine.

PERFORMANCE

Top speed at sea level	103 m.p.h.
Cruising speed	85 m.p.h.
Minimum flying speed	0 m.p.h.
Maximum rate of climb at sea level	1,200 ft-min
Hovering ceiling (in ground effect)*	7,000ft
Hovering ceiling (without ground effect)	5,100ft
Service ceiling	14,000ft
Fuel consumption	25 gall/hr approx.

* For example, over mountainous terrain.

WEIGHTS

Gross weight	5,100lb approx.
Weight empty	3,850lb approx.

DIMENSIONS

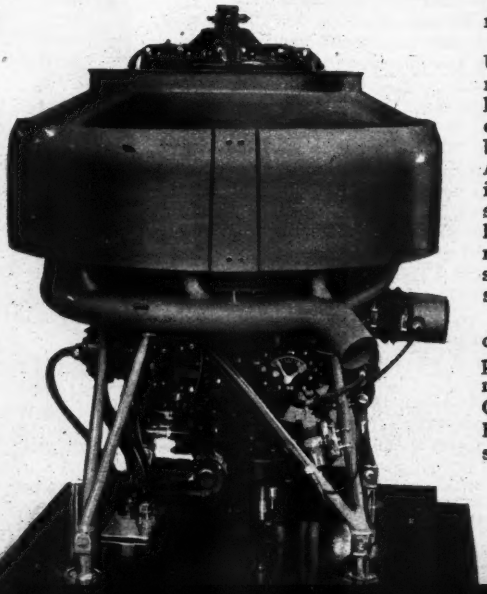
Length overall (blades extended)	57ft 0½in
Length overall (blades removed)	41ft 1¾in
Width overall (blades symmetrical)	41ft 0in
Height overall	12ft 11in
Main rotor diameter	48ft 0in
Tail rotor diameter	8ft 5in
Undercarriage track	12ft 0in
Undercarriage wheelbase	10ft 1in
Cabin length	8ft 4in
Cabin depth	4ft 3in
Cabin width (pilot's)	4ft 5in
Cabin width (passengers')	4ft 8in

plate assembly, which is restrained from rotation by a scissor link; the upper member of the swash-plate unit rotates with the whole of the head. Actuation of the screw-jacks, either singly or in pairs, will bring about displacement of the swash unit from a plane normal to the drive shaft axis. This displacement is conveyed to the rotor blades by push-pull rods which join the upper swash-plate to torque tubes carried above the blade links. The latter terminate at universal joints, the outboard halves of which connect, through bell-cranks, to the blade shanks. Thus, as the rotor revolves, the push-pull rods following the swash-plate tilt will bring about cyclic variation of blade pitch. When all three screw-jacks are operated simultaneously the swash-plates are not tilted but move axially. Pitch change is then the same for all three blades; in other words, is collective. Both cyclic and collective pitch change can, of course, be applied at one and the same time.

Transmission Details

Drive from the engine is given through a centrifugal clutch contained within a bell-housing, around the skirt of which are fitted the cooling-fan blades. The short transmission shaft has Hardy-Spicer universal joints at each end and runs up to the reduction gear box (two-stage epicyclic) mounted in the rotor pylon structure. A take-off drive is furnished in the gear box for the tail-rotor shaft. The main output shaft from the gear box is coupled to a three-armed spider, upon which the blade links are pivoted through the medium of flapping hinges, the blade shanks being, in turn, pivoted to the blade links through drag hinges. Angular accelerations of the blades in azimuth are looked after by double-acting hydraulic dampers which, in common with the undercarriage oleos, are made by the Turner Manufacturing Co.

The main rotor blades are of parallel plan-form for approximately half their length, then taper to the tips, and are built-up with wooden ribs on a step-tapered tubular steel spar. Plywood covering is used over 60 per cent of the chord, the final covering being two thicknesses of fabric. This description is applicable to the American blades, which have proved to be very successful and have an approved life of 1,000 hours. It is, however, planned that later aircraft will use all-metal blades of Sikorsky design and Westland manufacture.



The helicopter version of the Alvis Leonides 9-cylinder air-cooled radial engine which will be used to power the Westland-built S-51. It delivers 500 b.h.p.

The tail rotor is also a three-blade unit normally acting as a pusher airscrew to counterbalance torque reaction of the main rotor which, viewed from above, rotates anti-clockwise. Tail rotor drive from the main reduction gear box runs down to a secondary gear box at the elbow-joint at the root of the tail boom, and here provides a gear-drive for the tachometer and a belt-drive for the main generator. From here the tail drive shaft runs along the ridge of the tail boom enclosed by a separate fairing, and terminates at a bevel gear. Control motion for rudder action is transmitted through cables to a pulley behind the hub, this pulley actuating screw-jacks to a spider from which extend push-pull links to the blade roots. The blades of the tail rotor are also hollow, and have their laminated birch leading edges armoured with abrasion strips of stainless steel. Chordal ribs are of spruce, the external covering being a thin skin of mahogany plywood. Hordern-Richmond will be responsible for the British manufacture of these units.

The first Westland-built S-51 is expected to emerge about midsummer this year, and will quickly be followed by a second which, in fact, will be the first production aircraft. An intensive flying development programme is scheduled so that the company will accumulate as large a fund of operational data as possible, and as an extension of this policy the decision has been taken that no S-51 will be sold abroad from this year's output. This may, of course, be modified if nothing more than minor teething troubles are encountered, but, broadly, Yeovil's 1948 production will be restricted to sales to home users.

In the sales connection, the United Aircraft-Westland agreement gives sales rights to the English company for the whole world excepting the U.S.A. and Canada, but including South America. Another interesting sales decision is that, in order to avoid potential spares delays in the case of a helicopter operating in a remote region, the Westland S-51 will be sold together with a basic set of spares as an entity.

The standard helicopter is, as described, a three-passenger and pilot aircraft, but extras in equipment will be available if desired. One such form of addenda are the hydraulic hoist and keel beam respectively for small and large loads.

Fury Factory

"Flight" Calls at the Langley Plant and Airfield of Hawker Aircraft

Illustrated by "Flight" Photographs

ON one of those golden days when winter was gracefully withdrawing before a precocious sun, the tarmac at Langley resembled a crocus bed. From Control one saw glinting Sea Furies, with tri-colour Netherlands Naval markings thrown into bold contrast by their grey sides. Identical machines awaited flight test in their yellow priming coats; others bore the less prominent insignia of Great Britain or Canada. The silver Tempest flown by Air Marshal Sir Roderic Hill since the V-1 days, was parked with blunt-nosed Tempest IIs, in their stained B.A.F.O. camouflage, and Hawker's blue and gold Rapide transport awaited the next call on its services.

Our first business took us into the shops, where Mr. W. F. Clarke, the works supervisor, and Mr. H. R. Turner, assistant works supervisor, explained some of the features and factors which keep Fury and Sea Fury fighter-bombers rolling out at a healthy rate. Sea Furies for the Royal Navy, Royal Canadian Navy and Royal Netherlands Navy, are going through in company with a batch of Fury Baghdads (for Iraq) and the first of the Fury Trainers. Apart from having no Naval equipment, the land-based machine differs little from the carrier-borne model. The empty weight, of course, is less and, though the wing-locking pins are fixed in place, the mainplanes are detachable outboard of the guns for transport—a feature which has strongly commended itself to the Iraqi Air Force in simplifying salvage and major maintenance operations.

Similar to the version to be built under licence by Fokker in Amsterdam, the Netherlands machines are identical with the British and Canadian Sea Furies, but have different equipment. The current Sea Fury F.B. XI is merely a "fully-modded" Mark X.

Valuable economies have been effected in Sea Fury production (which term may be considered hereafter to embrace the Fury) by the use of a special rig enabling the functioning of flaps, undercarriage, wing folding and even the brake lever to be checked in position before the fuselage is lowered on to the wing. A crane operator performs this

Two of the Hawker test pilots—Mr. T. S. Wade (left) and Mr. F. Murphy (right)—with Mr. F. H. M. Lloyd, Hawker's Sales Manager.

Fury Factory . . .

latter manœuvre with marvellous sensitivity and skill. Representative of the other end of the manufacturing sequence is the hydraulic stretch-bending process, evolved by A. V. Roe. We watched it being applied to the two-piece "transport joint" frame of the Fury fuselage.

Having seen the conveyor stoving-oven and the spray-booth for wings, and watched the rubbing-down and finishing operations, we had a special interest in a newly painted Sea Fury for Holland, immaculate under its varnish. (A considerate bystander offered to apply talcum powder for our photographer's benefit.) Mr. Clarke has lately been watching the standard of finish with special care, and the machine examined—typical of those now coming through—reflected from its polished surfaces the highest credit upon those who had applied the Cellon varnish finish over I.C.I. or Cellon primer.

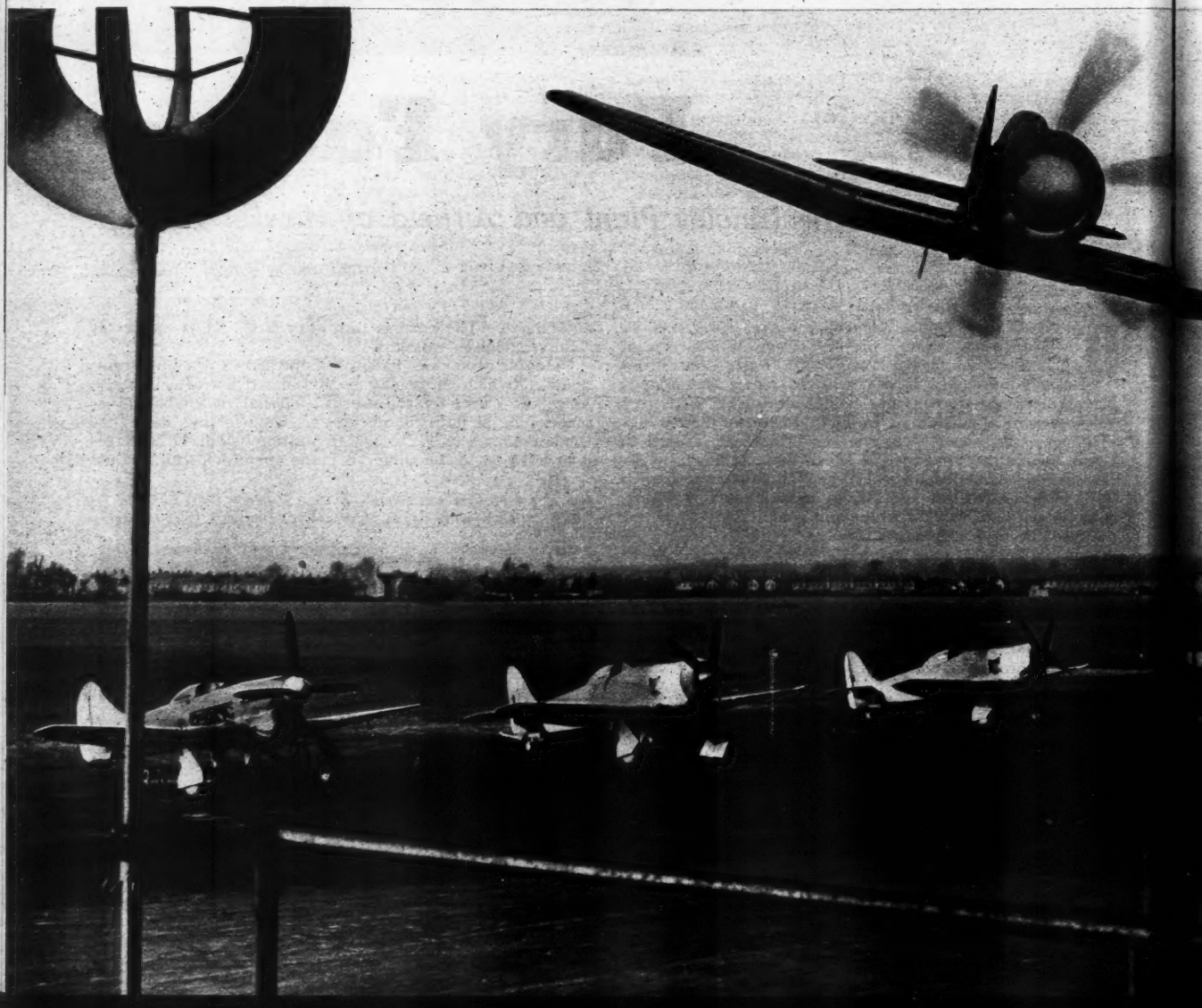
Activity at Langley is not confined to building, testing and developing the Fury and Sea Fury. Tempests are still coming in for repair, and a few production jigs have been retained for use in cases where stripping is necessary. Development of the two-seat Fury Trainer and of the target-towing version of the Tempest (T.T., V, with Sabre IIB or IIC) is in hand and a certain amount of flying is still being done on the Sabre-engined Fury I fighter. The original Centaurus-powered Fury, a slightly non-standard model, is being prepared as a demonstration machine, and its civil registration—G-AKRY—should soon be familiar on airfields at home and overseas. Another Fury is being groomed as successor to the pet Tempest of Air Marshal Sir Roderic Hill, Air Member for Technical Services.

Occasionally one is fortunate enough to see at Langley the prototype of the Nene-powered N.7/46 fighter, the beautiful lines of which, expressed in a model, were so much admired at Radlett.

Two versions of the Fury Trainer—the Iraqi type, with separate cockpit enclosures, as shown on another Radlett model, and the British Naval variant with a "tunnel" enclosure between pilot and pupil—are being developed. The Naval machine has a mirror device which permits a gyro gun-sight to be used from the rear cockpit. Both models will carry representative fighter or fighter-bomber equipment and armament.

Mr. W. Humble heads the team of pilots responsible for testing all Hawker aircraft. He was absent when we called on a Fury delivery flight to Iraq, where he was reported later to have staggered the populace with a characteristic acrobatic performance. His colleagues are Messrs. F. Murphy, T. S. Wade and E. S. Morrell.

From Mr. Murphy we learnt something of test-flying procedure, the thoroughness of which is attributable primarily to exacting Ministry of Supply requirements, but in part to the standards set in the pre-Horsley days by "George" Bulman, doyen of test pilots. To ensure that all aircraft are passed out to a common standard, so that they may be operated at their maximum efficiency on reaching an operational unit, the test procedure is laid down in a quite



▲ *Furies and Sea Furies on the production line at Langley. In the background are Tempests, in for repair, and at the extreme left (below the Tempests) is one of the first Fury Trainers.*

Mr. H. R. Turner, assistant works supervisor at Langley, is seen on the right, with a new Sea Fury XI, being prepared for flight test. The thin wing section can be fully appreciated at the fold-joint. ▶

Below is an impression of a Sea Fury and a vista from the Langley control tower. Unpainted Sea Furies are mingled with Tempests awaiting test after repair. ▼

elaborate booklet entitled *Flight Testing of Production and Repaired Sea Fury Aircraft*. This divides the schedule into three sections—ground check, general flight check, and check on installations. It is recommended that the tests be conducted in a certain sequence. First, the sliding hood is examined for scratches or distortion and the pilot ensures that it rides freely on the runners and is a good seal when closed. Next he checks his harness, ensures that all instruments are undamaged and correctly labelled, and notes the working of elevator, rudder and aileron controls, rudder and elevator trim tab controls, the engine control box, flap selector lever and hand pumps, fuel cocks, air conditioning, wing folding and electrical services. During the engine run, he notes the functioning of the pneumatics, carburettor air intakes, oil cooler automatic control and hydraulics. Whilst taxying he must ensure that the undercarriage is soft and has no tendency to bucket or roll.

Under the heading "General Flight Check" are listed rudder trim, lateral trim, fore and aft trim, fore and aft stability, rated altitude and speed and dive tests. Weather permitting, every aircraft is dived to an indicated speed of 435 knots, if below 12,000ft, or a Mach number of 0.78. A graph is provided to show the A.S.I. reading required to obtain this Mach number above 12,000ft. During the speed test, the date and time of the flight are noted in case air temperatures should later be required from the met. office for reducing the performance figures to standard.

The third phase of testing—the check on installations—covers the complete oil system, engine cooling shutters, fuel system (with or without drop tanks), single-lever power control, engine functioning check, carburettor air intakes, supercharger warning light, undercarriage warning light and arrester hook.

So thoroughly are the Langley-built machines equipped and tested that on delivery they are ready for action as soon as the ammunition boxes are filled.

Malayan Aviation in the Making

Development of Civil Air Communications in the Malay Peninsula and Singapore : Observations by an Official of Malayan Airways

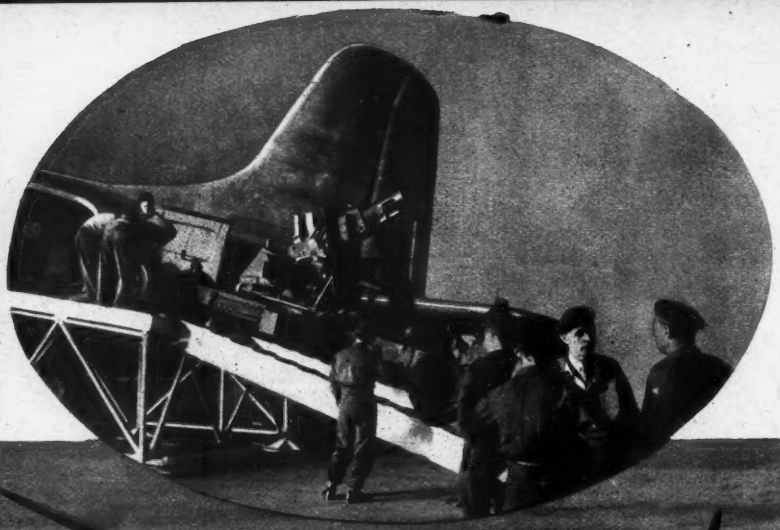
ON May 1st, 1947, nearly two years after V.E. day, an Airspeed Consul took off from Kallang airfield, Singapore, on the first post-war Malayan Airways commercial flight. That aircraft, VR-SCD, was the second to be entered on the Malayan register, and was preceded only by a Miles Gemini belonging to the Government. Since then more than eighteen have been registered, of which five were Dakotas and three were Consuls belonging to the same local company, Malayan Airways, Limited, two were Geminis belonging to the Government, and the rest were owned by the Singapore and Kuala Lumpur flying clubs, and private owners.

Like most airlines, Malayan Airways started with the accompanying difficulties of uncertain deliveries, the prevarications of governments, and the uncertainties attached to shareholders and their representatives. At the end of the war Malaya was left with many airstrips built by the British before 1942, some of which had been extended by the Japanese. So many, however—and Gong Kedak in Kalanta is a good example—were long distances from the centres of population, and those which were near the big towns were invariably in urgent need of repair, especially the buildings which, although they were still standing, were in a sorry state of dilapidation. In 1945 R.A.F. Transport Command moved into Malaya, evacuated prisoners of war, and brought in military and civil administrators. A year later B.O.A.C. and Qantas partially restored the civil flying facilities at Singapore and temporarily at the Penang marine base. But it was not until the civil government was firmly re-established, towards the middle of 1946, that the Civil Aviation department assumed effective control and started to replace the temporary R.A.F. facilities. At about that time the Ocean Steamship Company, of Liverpool, and the Straits Steamship Company, of Singapore, planned a Malayan airline, and by May 1st, 1947, the main airfields

(Top): Looking along the East-West runway at Changi airfield, Singapore. On the left can be seen temporary terminal buildings at the southern end of the airfield. (Centre): Terminal buildings at Kuantan on the East coast. (Bottom): An interested passenger talking to a B.O.A.C. receptionist and on the right a Lancastrian engine receiving attention at the same airport.

Achievement
High Speed Jet Trainer
The Gloster "Meteor VII" is the first British jet-propelled dual instruction aircraft. It is powered by two Rolls-Royce Derwent V engines.
The Meteor Trainer is an aircraft of exceptionally high performance with which pilots can be efficiently trained in the handling and navigation of modern jet-propelled fighters.
ROLLS-ROYCE
POWER PLANTS
for Speed and Reliability
LIMITED · DERBY · ENGLAND

HASTINGS



Hastings, Britain's largest and fastest military transport, is in production for the R.A.F.

Hastings' multi-purpose function includes freighter, paratrooper, ambulance and glider-tug.

Hastings' big fuselage accommodates 7½ tons of military equipment or seats for 50 troops.

Hastings cruises at more than 300 m.p.h. and its range exceeds 3,250 miles.

HANDLEY PAGE

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Malayan Aviation in the Making . . . . .

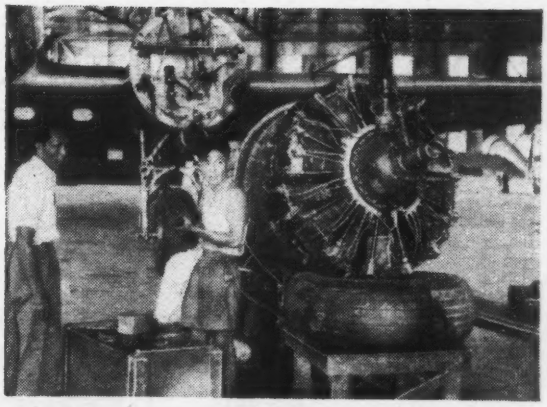
in the proposed system were ready for operation with skeleton control and with the essential radio aids. Malayan Airways were ready to start with one Airspeed Consul.

Runways at Kallang have since been repaired and extended, one hangar has been completely restored and others are under repair, while local residents have been recruited and trained as Control officers. Every airport in the system has air-to-ground and point-to-point radio and also meteorological forecasting. Within Malaya the company now operates 19 flights a week from Singapore to Kuala Lumpur, seven to Ipoh and Penang, two weekly to Kuantan and Kota Bharu on the East coast, and twice a week to Penang and Kota Bharu. In the international field the company operates from Singapore twice a week to Batavia, a distance of 500 miles; to Bangkok, 800 miles; and once weekly to Saigon, Palembang and Medan.

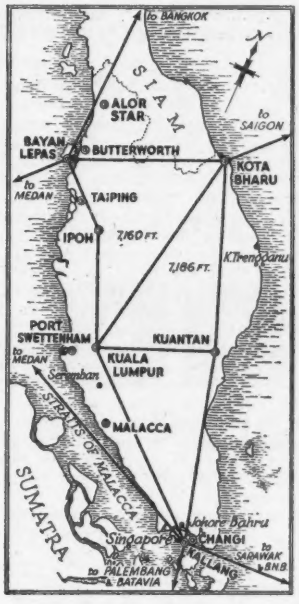
Throughout Malaya air transport is now regarded as a normal method of conveyance for the moderately wealthy traveller. Fares are about 25 per cent above those for first-class railway journeys, but trains are slow, hot and dirty, and the £10 fare from Singapore to Penang, a distance of 360 miles, is considered reasonable. Kallang airport, which has modern passenger handling buildings, customs facilities, a restaurant and bar, is situated between the two main residential districts of Singapore and is nearer to both than the railway station. The tickets issued by Malayan Airways are small and only a few entries are required for a booking which, incidentally, is frequently made immediately before departure. Passenger lists, manifests and loadsheets also are more simple than the voluminous documents common elsewhere.

Training Local Labour

Ground aids and their maintenance are the responsibility of the Civil Aviation and Telecommunications department of the government, and with the exception of the headquarters staff at Singapore the operators are normally recruited from local residents. For nine months after the war Quantas Empire Airways lent engineers to Malayan Airways, but with the help of B.O.A.C., who have since acquired a minority interest in the company, sufficient engineers have now been recruited. Stewardesses on the scheduled services are Malayan, but practically all other aircrew and licensed engineers are European; local-born radio officers are however under training, and an extensive apprenticeship scheme has also been started to train local boys as licensed ground engineers. Captain R. P. Mollard, who was line manager at Durban, is at the head of the technical organization. Flying is undoubtedly becoming a habit in Malaya, and membership of the flying clubs is high in spite of the post-war flying cost of £2 an hour. Mr. David Fiennes, an official of Malayan Airways from whom comes this news, is of the opinion that although the future will depend upon many factors both economic and political, with peace in South-East Asia and reasonable prosperity, Singapore will become as great a centre of air transport and air commerce as it is for shipping.

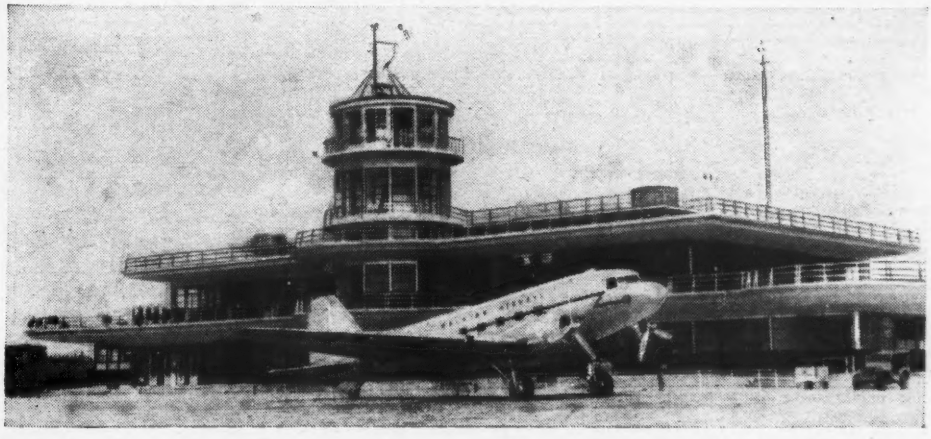


Local labour has been recruited for Malayan Airways, and there are sufficient engineers to maintain the company's own aircraft and those of other operators and local flying clubs.



The internal air routes of the Malayan Peninsula.

In order to cover the East Indian Archipelago and its many islands with a network of air routes with Singapore at the centre, Mr. Fiennes believes that special attention must be paid to two factors: The first concerns Malaya only, and requires that if aviation is to pay, without unreasonable fares being charged, it must be based on local skill and talent. Government help would be required to provide technical education and to sponsor scholarships for training in England. The second factor concerns the English manufacturers. At five-yearly intervals economic aircraft of the right size and with all the "bugs" taken out must be provided. They must also be complete with spares schedules and an assured spares supply over several years. Special attention must be given to such tropical problems as air-conditioning, particularly whilst aircraft are on the ground. In his opinion there has been too much emphasis in England upon small feeder-line aircraft seating six to twelve passengers. The operator in Malaya is faced with the problem of providing travel facilities for large commercial communities over considerable distances of sea and jungle, and a still air range of not less than 1,200 miles is required; and a cruising speed of 200 m.p.h. would allow comfortable schedules to be arranged. Aircraft to carry twenty to thirty passengers are needed, with facilities for rapid handling of baggage and mail at destinations en route. The airfield programme is still undecided, but if airfields are not be extended the take-off distance at the all-up weight should not exceed 1,200 yards in tropical conditions.



Tarmac and airport buildings at Kallang Airport. Overseas passengers normally report 30 minutes and those for internal services 15 minutes before departure time. Seventy-five per cent of the travellers in Malaya are not European.

HIGH-SPEED FLIGHT RESEARCH

Concluding Part of Mr. H. Davies' Lecture Before the R.Ae.S.

Continued from page 333, March 25th

Stability and Control

The earliest experiences of compressibility effects on the longitudinal characteristics of an aircraft were concerned with the large and often dangerous changes of trim which occurred in high-speed dives, and a number of measurements of these effects were made (Fig. 7).

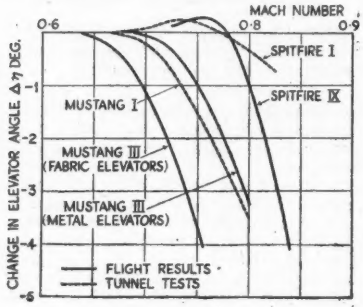


Fig. 7. Spitfire and Mustang. Change of elevator angle with Mach number, measured relative to elevator angle to trim for "lg." at same E.A.S. at low Mach number.

That these effects really were due to compressibility and not to aeroelastic distortion in these cases is shown by Fig. 8. At 10,000ft there is practically no change in elevator angle to trim up to an equivalent air speed of 450 m.p.h. At 30,000ft, however, there is a large change at below 350 m.p.h. E.A.S. We are not, of course, always favoured with such an absence of distortion effects. In the case of the Me.262, for example (Fig. 9), as you see the compressibility effect is more than offset at low altitude by distortion, which greatly complicates any attempt to analyse the overall effects.

The change of trim at high Mach number is the result of a combination of compressibility effects on C_{mo}, aerodynamic centre, $\frac{\delta C_L}{\delta \alpha}$ and ϵ. It is difficult to separate out these effects in flight, though attempts have been made to do this by measuring the tail loads by means of strain gauges.

Stability

These changes of trim imply changes

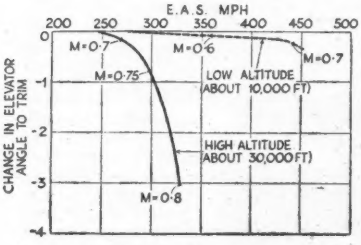


Fig. 8. Mustang. Elevator angles to trim at high speeds at two altitudes.

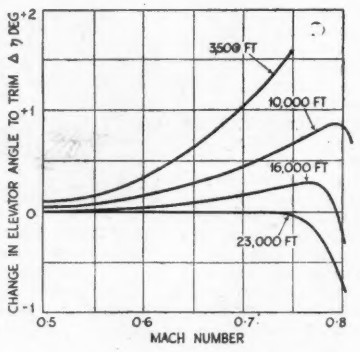


Fig. 9. Mach number and distortion effects on elevator angle to trim Me 262.

in longitudinal stability. Unfortunately, it is difficult to derive precise conclusions regarding the stability changes from dive tests, because the lift coefficient is necessarily very small throughout the dive. This is one of the fundamental weaknesses of the dive technique. Luckily, however, the rapid development of jet engines has enabled sufficiently high speeds to be achieved now to investigate these effects in level flight.

In this case (Figs. 10 and 11) the static margin was slightly negative at low speeds. At a Mach number of 0.8 the negative static margin suddenly becomes extremely large, at all heights. The stick-free static margin behaves similarly.

It is not at all certain, at the present state of our knowledge, how important such a large reduction in static margin is at high speeds. It is probably not nearly as important as such a change would be at low speeds.

What is undoubtedly important at high speeds, however, is any variation in

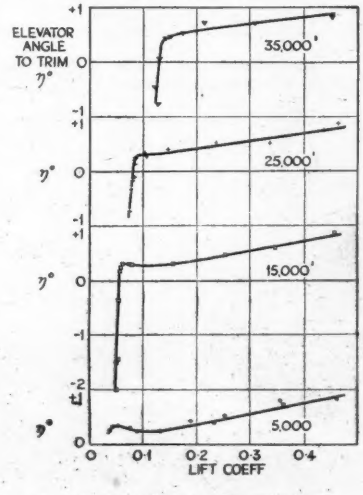
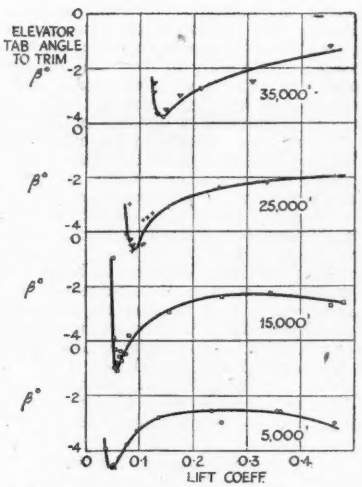


Fig. 10. Vampire I. Elevator angles to trim.



No. 11. Vampire I. Elevator tab angles to trim.

the slope of the curve of η (or C_m) against C_L, not for level flight, as in this diagram, but for constant Mach number.

The result is shown in Fig. 12. The slopes of these curves represent virtually the manœuvre margins, and as you see the variation is somewhat involved. The peculiar curve for M=0.79 is a little uncertain, but is, I think, roughly true. This is one of the few cases incidentally where comparison with tunnel tests is rather disappointing.

The next diagram (Fig. 13) shows the results of similar measurements on a Meteor IV. Here again there is a large loss in stick-fixed static margin at high speeds, but in this case there appears to be a large increase in stick-free static margin, for reasons which I will return to in a minute. In the meanwhile, notice that when the tab angle to trim is plotted against Mach number, the result is a unique curve.

In this case there is a steady decrease in $\left(\frac{\delta \eta}{\delta C_L}\right)_m$ with increasing Mach number. Even at a Mach number of 0.75, there is

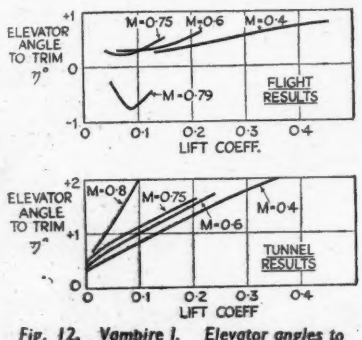


Fig. 12. Vampire I. Elevator angles to trim. Flight results shown above, tunnel results below.

The

ALVIS

LEONIDES ENGINE
of the
WESTLAND SIKORSKY
TYPE "S-51" HELICOPTER
is fitted with

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PLUGS

LODGE PLUGS LTD., RUGBY, ENGLAND.

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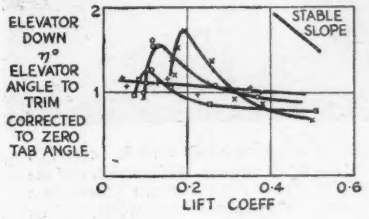
High-Speed Flight Research . . . . .

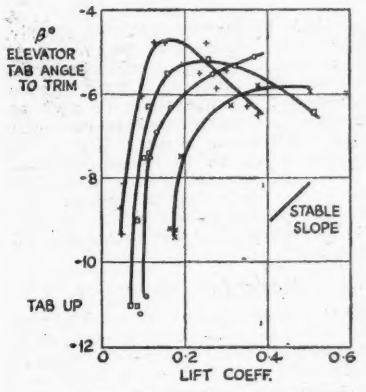
a considerable degree of instability shown by these curves (Fig. 14).

The slope of these curves represents, as I have said, in effect, the manœuvre margin. This can, of course, be measured directly, by measuring the stick movement and stick force per g. These measurements are rather difficult, but an example of the results obtained in flight on a Spitfire is shown in Fig. 15, with a comparison with tunnel tests.

Hinge Moment Characteristics

I have been attaching some importance to stick-fixed stability characteristics because in future aircraft with power controls, the stick-free characteristics





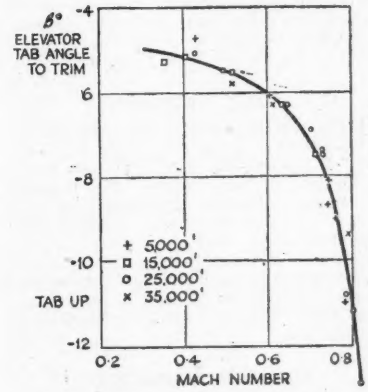


Fig. 13. Meteor IV. Elevator angles and tab angles to trim. (14,000 r.p.m.)

will be unimportant. Stick-free characteristics are, however, still important, at least on existing aircraft, and we saw how the stick-free characteristics can vary with Mach number in a totally different way from stick fixed. This is because control hinge-moment characteristics are themselves dependent on Mach number.

There have as yet been very few measurements of hinge-moment characteristics in flight. The variations in hinge-moment characteristics have, of course, important repercussions on the stick-free stability characteristics and on the manœuvre margin. The apparently peculiar variation in tab angle to trim on Meteor is due to such effects.

There is still much to learn about the effects of these variations in stability derivatives and hinge-moment characteristics on the overall flying characteristics of the aircraft. The fact that this can have quite serious consequences is illustrated by Fig. 16 which shows what happens to the elevator

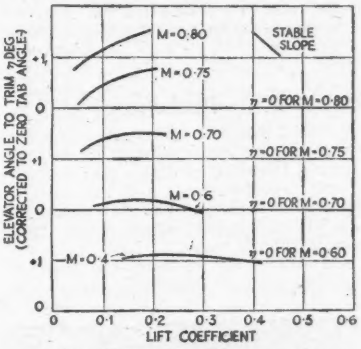


Fig. 14. Meteor IV. Elevator angles to trim at constant Mach numbers.

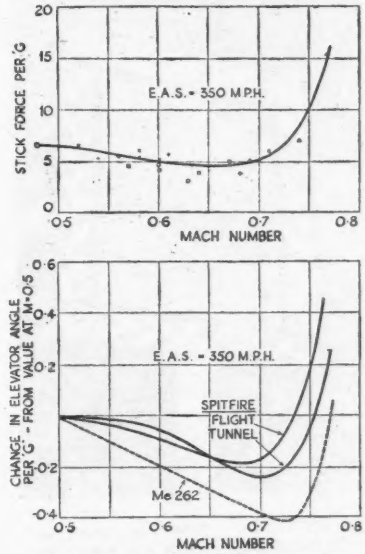


Fig. 15. Variation in stick-fixed manoeuvre margin at high Mach numbers. Comparison of flight and tunnel tests Above, compressibility effect on manoeuvre margin, Spitfire XXI.

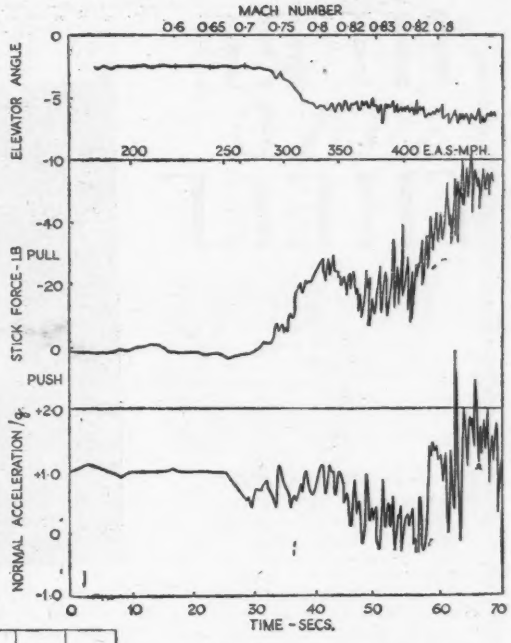


Fig. 16. Mustang elevator movements, stick force and normal acceleration in a dive.

angle, stick force, and normal acceleration on a Mustang in a dive to a Mach number of 0.83. The violent oscillation shown was in this case undoubtedly due to a reduction in $(-b_z)$ and possibly an increase in b_1 with Mach number, combined probably with a large increase in $(-\delta C_m/\delta C_L)$. Oscillations of this kind occur on many high-speed aircraft, though they are not always due to the same cause.

I hope I have said enough to illustrate the invaluable contributions which research in flight can make towards the solution of the problems of high-speed flight.

Much still remains to be done, however, particularly on new plan forms of the sweptback and delta variety, and at Mach numbers above 0.8. These increasing Mach numbers will eventually bring us up against new and perhaps graver risks, of a kind not previously experienced due to the loss of control effectiveness indicated by wind-tunnel tests at Mach numbers around 0.9. There is a lot to be said under these circumstances for trying to make preliminary experiments on pilotless aircraft or models. I do not myself believe, however, that this should deter us from pressing on with experiments on piloted aircraft to the highest possible Mach numbers. Because, with a piloted aircraft, the dangerous region can always be approached gradually, analyzing fully the results of each test before proceeding to a slightly higher Mach number, thus ensuring reasonable safety, because compressibility effects never occur without some warning.

It is by utilizing to the fullest extent all the available resources that we can best hope to solve the immense problems with which we are still faced in high-speed aerodynamics, and there is no doubt that piloted flight research should continue to form one of the most important links in this work.

HERE AND THERE

Confidence

FOUR weather forecasters who are so confident of their powers of prediction that they have agreed to be sacked if they fail to forecast more than one storm out of ten, are to form part of the staff of an American airline, according to a report published recently.

Tractors for Export

AN order valued at between £10,000 and £11,000 has been completed and despatched by David Brown Tractors, Ltd., to the Royal Iraqui Air Force. Originally developed for hauling heavy bombers of the R.A.F. these heavy industrial tractors have found a firm market in the Middle East particularly in the oilfields. It is expected that export orders for these tractors will exceed £1,000,000 this year and output is being increased as fast as steel supplies will allow.

Miles Break-up

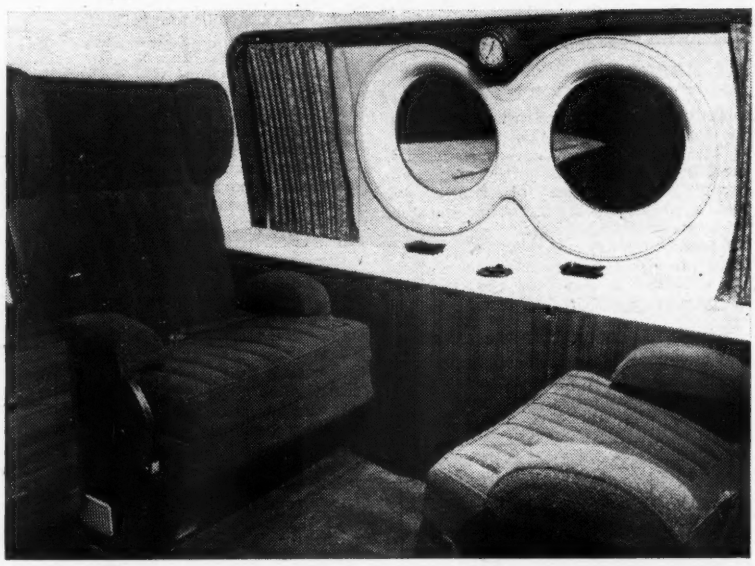
THE outcome of protracted negotiations to keep the Miles Aircraft Company, Limited, together is that arrangements have been made by the Receiver for the closing down of the aircraft section and the development of the other sections of the business, i.e., the manufacture of duplicating machinery and fountain pens. To ensure the orderly liquidation of the assets of the aircraft department an agreement has been entered into with a leading aircraft manufacturer, rumoured to be Handley Page, Limited, to take over the control and management of that department and thereby to complete certain of the current contracts under conditions which will ensure that the assets are realized as far as possible on a going-concern basis.

Record Drop Claimed

SERGEANT-MAJOR LES VALENTIN of a French parachute regiment has claimed a world record after jumping from a Halifax at nearly 24,000 feet and not opening his parachute until he was about 3,000 feet from the ground. The duration of his "free drop" was reported as 109 seconds—over a minute and a half—and was performed without the use of an oxygen mask, near Pau, in south-western France.

Taxiway Identification

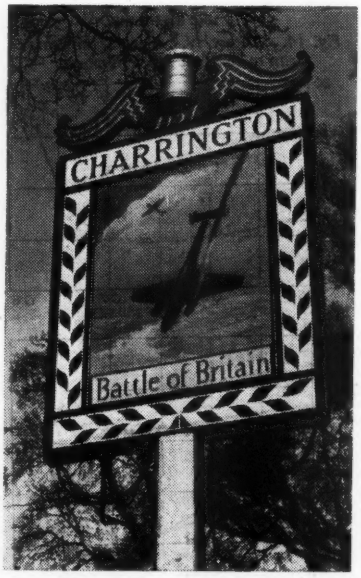
AT certain airfields, it is announced in M.C.A. Notice to Airmen No. 101, it has been found difficult in conditions of poor visibility to distinguish, from the air, between runways and taxiways, adjacent to one another. To prevent confusion in such conditions the taxiways are to be made easier to identify by having white or yellow diamonds painted upon their surfaces at 200ft intervals and in pairs, one on either side of the centre line.



ROOM WITH A VIEW: The private stateroom in one of the two V.V.I.P. Tudor IIIs. A toilet adjoins. Interior decoration was completed by Armstrong Whitworth's, and the clever use in a pressurized hull of paired portholes with a large common frame gives the good look-out and pleasing impression of a much larger window than would, in fact, be practical in such an aircraft.

U.S. "Pack-Plane"

A CONTRACT has been placed by the U.S. Air Force with the Fairchild Aircraft Division, to design and develop a military transport aircraft with a detachable fuselage. The plan visualizes a type of aircraft which could land supplies at an advanced base or improvised airfield and, leaving one fuselage on the ground detached, rapidly be attached to another fuselage already filled with casualties to be evacuated. Thus several fuselages would be accumulated by relatively few "prime movers," and these could be used as medical huts, storage shelters, command posts and repair shops. The prime movers would be so constructed that they could fly without the detachable portion of the fuselage if required. The designs specified by the U.S.A.A.F. call for a 9-ton payload and range of 2,000 miles.



VICTORY SIGN: A new inn named the "Battle of Britain" has just been built at Shears Green, Northfleet, Kent, not far from Gravesend Airfield. An enemy Aircraft was shot down a few hundred yards from the site.

Maps for Passengers

B.O.A.C. have produced for the interest and convenience of passengers, maps of the routes over which they will fly. Attached to these coloured maps are descriptions of the countries and districts which lie on the route, and the peoples who inhabit them; these notes have been written by Mr. Geoffrey Harrison.

D.H. Journal

THE official organ of the D.H. Aeronautical Technical School, *The Pylon*, Volume VII, No. 2, has now been published. This issue of the journal presents a striking appreciation of the late Geoffrey de Havilland. In an article on propulsion and jets, Mr. C. C. Walker, C.B.E., A.M.I.C.E., F.R.Ae.S., discusses his topic in an interesting manner which can be easily understood by those of only moderate technical experience.

Valuable Suggestions

UNITED AIR LINES expect to save 30,000 man-hours annually, representing an estimated cost of $37,699, through adopting suggestions submitted last year by their employees. The awards for ideas totalled $27,795, individual payments averaging $13. The highest award was $1,000 to a building maintenance mechanic for a new type of

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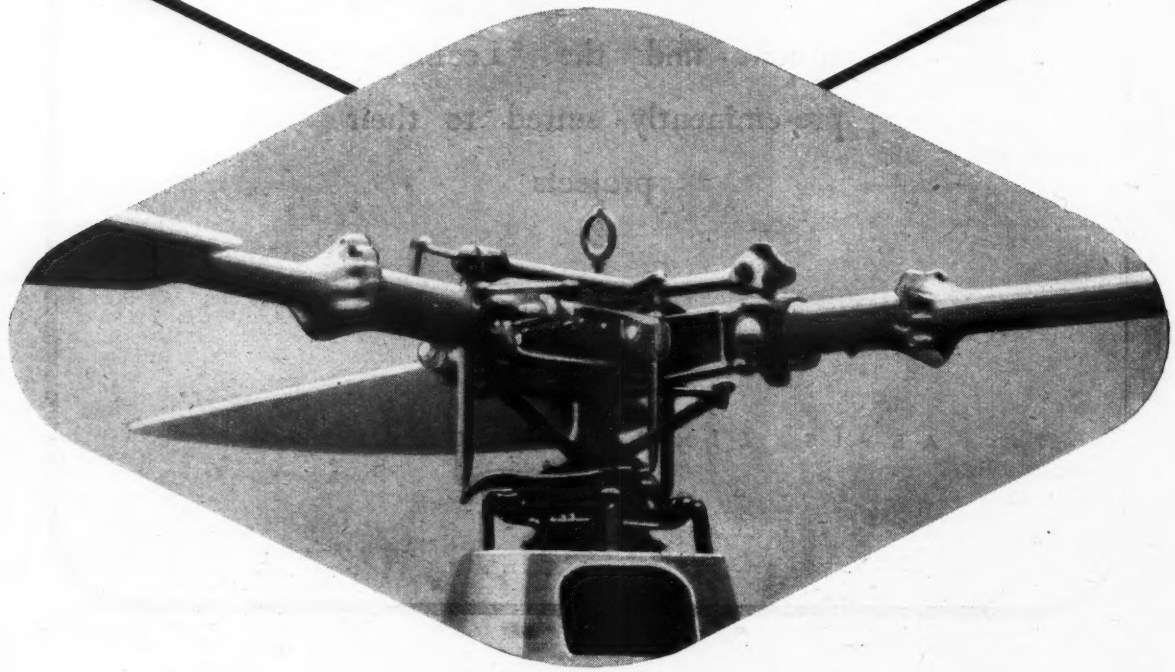
The first Westland-Sikorsky-51 Helicopter is the latest modern aircraft to fly with Goodyear tyres, wheels and Single Disc brakes. Single Disc brakes have also been chosen for the rotor brake. The increasing popularity of Goodyear Aviation Products is the result of their proved efficiency under the harshest operating conditions. This efficiency has only been made possible by increasing research and long experience in meeting the existing conditions of aircraft service. The Goodyear Aviation Products Department at Wolverhampton welcome difficult braking problems and are always at your service.



HERE AND THERE

filing system. In 1946 the highest award was $2,500 for an infra-red cockpit lighting system.

R.G.S. Lecture

WING COMMANDER DOUGLAS N. KENDALL, O.B.E., managing director of the Photographic Survey Company, an associated company of the Hunting Aviation Group in Canada, is coming to England shortly for a brief visit. On Monday, April 19th, he will lecture to the Royal Geographical Society on "Aerial Magnetometer Surveys" and it is expected that the lecture will be attended by many leading geologists.

Test Pilots Committee

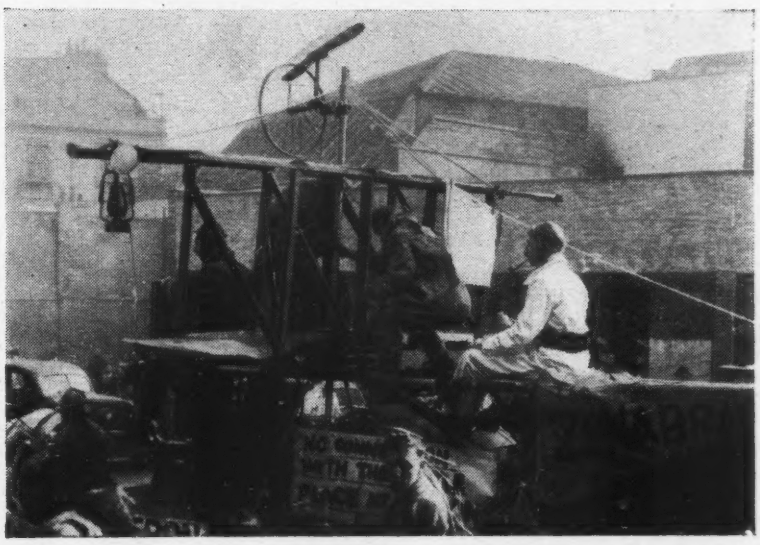
AT the G.A.P.A.N. meeting on February 5th, Group Capt. Bulman reported on two meetings of the test pilot section of the Guild and the S.B.A.C. regarding the setting up of a committee to advise the Ministry of Supply in the approving and grading of test pilots and airfields. Agreement had been reached to set up a joint committee for the purpose. Owing to the retirement of Mr. J. E. D. Scott from the position of hon. secretary to the Guild's test pilot committee, his place has been taken by Major J. Cordes.

Butlins Aerial Week-ends

BUTLINS, LTD., have altered the dates of two of the aerial week-ends arranged to take place at their holiday camps this year. The opening of Skegness airfield, which was due to take place on June 26th and 27th, as reported in *Flight*, March 18th, will now take place a fortnight earlier, and the aerial week-end at Broom Hall arranged for June 12th and 13th has been postponed a fortnight; in fact, the week-ends chosen are the same but the sites have been switched.

Easter in Holland

A PARTY of 20 schoolgirls from the Harrow College for Girls left from London Airport on March 25th by K.L.M. Skymaster for the Easter holidays which they spent with friends at a Dutch school. This party was taken by the headmistress, Miss Pulling, who is the founder and owner of the Harrow College. It is hoped that a return visit of girls from the Kopjes School, Bloemendaal, will be made by air later in the year.



SUBSONIC NIGHTMARE: An unusual if not exactly aeronautical machine constructed by aero-engineering students of Bristol University for their Rag-Day Procession. To prevent confusion the notice reads: "No connection with the little place at Filton."

News in Brief

The estate of Mr. Orville Wright, who died at Dayton, Ohio, in January, has been valued at £267,000.

* * *

Air Chief Marshal Sir Roderic Hill will succeed Sir Richard Southwell as rector of the Imperial College of Science and Technology on October 1st.

* * *

Two aircraft were chartered through Lane's (Aircharters), Ltd., to fly a complete film unit to Belfast to film the World Flyweight Championship on March 23rd.

* * *

Mr. W. McClelland, F.C.A., managing director of Stenor, Ltd., Richmond, has been appointed managing director of Simmonds Aerocessories, Ltd., and Simmonds Products, Ltd. These new appointments will not affect Mr. McClelland's duties with Stenor, Ltd.

* * *

Lord Nathan, Minister of Civil Aviation, attended the annual civic dinner of the Harrow Urban District Council on Friday, March 19. Replying to the toast "The Guests," Lord Nathan spoke of the position of Harrow and Northolt airfield, referring to the local landmarks and the development of S.B.A. at the airport.

* * *

Mr. A. Hittinger, managing director of the National Benzole Company, Ltd., has been appointed chairman of the company in place of Mr. J. H. Olliver, who has retired. Mr. G. A. Hebden becomes deputy chairman and Mr. R. J. Smith is appointed a director.

* * *

According to recent information work on the Australian rocket range at Woomera is progressing; 130 miles of water pipeline is being laid from Whyalla and a large airfield, subsidiary air strips and roads are under construction. Progress is also being made with the construction of technical buildings and a model permanent township for 2,000 people.

* * *

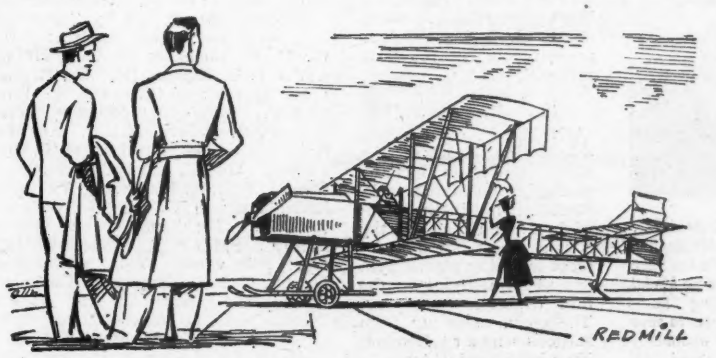
Capt. K. J. G. Bartlett, B.A.C. Sales director, has left by air for the Argentine where he will open the Bristol New Type 170 overseas sales campaign. It is his third visit to the Argentine and, as on a previous visit, he is accompanied by Mr. Colin Harvey of the B.A.C. Sales department.

* * *

The first Bristol New Type 170 to leave Filton took off on its delivery flight to France on March 18th. The purchasers—Compagnie Air Transport (Paris)—plan to use two of these freighters to carry fruit between North Africa and England. The delivery flight was performed by an all-French crew.

* * *

The Minister of Civil Aviation has appointed Mr. R. W. N. B. Gilling to be his private secretary in succession to Mr. R. D. Poland. Mr. Gilling left the Air Ministry to join the Planning Division of the Ministry of Civil Aviation in Feb., 1946. He was later Secretary to the Commonwealth Air Transport Council for a year.



She insisted old boy, says it matches her "New Look."

"Flight" photograph.

SEA-FARING FIGHTER: The first prototype of the Saunders-Roe S.R./A1 single-seater fighter flying boat, with twin Metropolitan-Vickers Beryl axial-flow turbo-jets. This type was designed to Specification E. 6/44 and is potentially capable of over 500 m.p.h.

Award

The King has been graciously pleased to approve the following award:—

BAR TO DISTINGUISHED FLYING CROSS.

ACTING SQUADRON LEADER FRANK WILLIAM MARIUS JENSEN, D.F.C., A.F.C., Royal Air Force No. 8 Squadron. As Squadron Commander this officer has at all times set a fine example and has trained his squadron to a high standard of efficiency which has been reflected in air operations.

S/L. Jensen was born in London in December, 1914, and was educated at Bermondsey Central School. He enlisted in the Auxiliary Air Force in November, 1933, as a metal rigger, re-engaged, and was embodied with the A.A.F. on the outbreak of war. He was afterwards trained as a pilot and was commissioned in 1941. In August, 1943, after taking a fighter leader's course he was given command of a squadron. He was reported missing after an operation in the following October and became a prisoner of war in Germany. He was awarded the Air Force Cross and the D.F.C. in 1943 and he also holds the Air Efficiency Award. In September, 1945, he was given a permanent commission in the General Duties Branch of the R.A.F. He has been serving overseas since 1947.

S. of S. at A.T.C. Meeting

THE Secretary of State for Air, Mr. Arthur Henderson, K.C., M.P., speaking at the opening of an A.T.C. Week at Rowley Regis, near Birmingham, on March 19th, referred to the establishment of the A.T.C. on Feb. 1st, 1941, and said: "Between that date and V.J. Day (August 15th, 1945) no fewer than 500,000 young men between the ages of 15½ and 18 joined its ranks. Of these some 170,000 completed their training in the Corps and joined the fighting Services. Some went into the air arm of the Royal Navy, others into the Army, but the majority—more than 100,000—enrolled in the Royal Air Force. How well they performed their duty I need scarcely say. Their deeds spoke for themselves, as is shown by the fact that it is known that those who won decorations (in a service in which the standard expected of a man was set exceptionally high) numbered more than 500. Today the strength of the Corps stands at some 800 units, with a total of about 42,000 cadets; but we need more, and we are hoping to get the numbers up to well beyond our present total in the near future."

GEORGE MEDALLIST: Flight Lieutenant Stephen Cunningham, who has been awarded the George Medal for "outstanding heroism" in his efforts to save the pilot after a Sunderland had crashed off Southend last year.

Royal Air Force and Naval Aviation News and Announcements

R.A.F. Rowing

AN R.A.F. eight rowed in the Head of the River race from Mortlake to Putney on March 20th. Starting 92nd in the sandwich division they did the course in 21 minutes 15 seconds, being placed 25th and thus qualifying for the first division next year. The crew, made up from stations near London, have been rowing together during the winter. This summer it is hoped to arrange practice for a crew drawn from the whole R.A.F. and to enter for Henley Royal Regatta.

"Possibles" for Olympic Games

TWENTY-ONE members of the R.A.F. and three of the W.A.A.F. have been notified that they may be among those representing Great Britain in the 1948 Olympic Games. They range from A/C.2 to Air Commodore. The senior officer is Air Comdre. W. E. Staton, C.B., D.S.O., M.C., D.F.C., who is already named as Captain of the Revolver Team. He is Commandant of the Central Bomber Establishment and has represented the R.A.F. in shooting matches eleven times.

Another well-known personality is W/C. D. O. Finlay, D.F.C., A.F.C., the hurdler, whose first Olympic appearance was in 1932. In the 1936 games he was Captain of the British athletics team. He joined the R.A.F. as an aircraft apprentice and later trained as a pilot. Many people will remember his aerobatic demonstrations at pre-war Hendon air displays. He is now Senior Air Staff Officer of a Reserve Command Group and has won the hurdling event in the R.A.F. Championships for ten consecutive years.

The full list of R.A.F. "possibles" is: *Athletics:* 400 metres: F/O. W. D. H. Conacher (R.A.F., Halton); A/C.1 T. L. Higgins (R.A.F., Henlow); 1,500 metres: A/C.1 D. R. Burfitt (R.A.F., Cranwell); 10,000 metres: S/L. P. C. Dainty, M.B.E. (Air Ministry); 110 metres, hurdles: W/C. D. O. Finlay, D.F.C., A.F.C. (H.Q., 63 Group); S/L. A. Hughes (R.A.F., North-Luffenham); F/O. R. H. Whitworth (R.A.F., Kirkham); 400 metres, hurdles: S/L. E. J. Brice (Air Ministry); Pole vault: W/C. M. V. Blake, D.S.O., D.F.C. (Transport Command); F/O. J. A. Redpath (R.A.F., Halton); Discus: S/L. L. Reavell-Carter, M.B.E. (H.Q., 1 Group); Weight: Cpl. C. W. Bock (R.A.F. Locking); Hammer: F/L. E. C. K. Douglas (R.A.F., Chessington).

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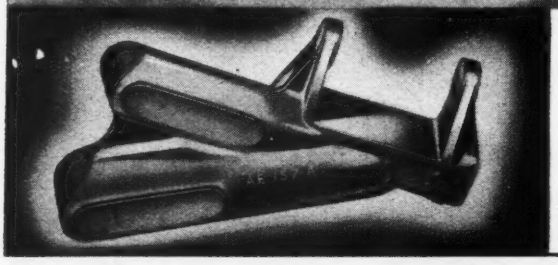

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Gymnastics: A/C.1 G. A. White (R.A.F., Melksham); *Boxing:* A/C.1 C. Tucker (R.A.F., Padgate); A/C.1 G. Hazell (R.A.F., Yatesbury); A/C.1 E. J. Seakings (R.A.F., Hednesford); *Swimming:* A/C.1 W. B. Tillotson (R.A.F., Padgate); *Shooting:* A/Cdre. W. E. Staton, C.B., D.S.O., M.C., D.F.C. (Central Bomber Establishment); *Fencing:* F/L. J. Reed (R.A.F., Cosford); *Rowing:* A/C.1 J. W. Cox (R.A.F., Pershore).

The following members of the W.A.A.F. have already been announced: Sgt. M. Ring, high jump; Flt/O. D. Billers, long jump; Flt/O. M. Bennion, javelin.

Short-Service Commissions

THE following officers have been appointed to short-service commissions in the R.A.F. branches shown:—

GENERAL DUTIES BRANCH

Flight Lieutenants: R. H. Burgess; J. W. Charman; G. Clubley, D.F.C.; R. Griffin; N. F. Grinham; C. K. Holbrook; A. Johnson J. S. Meiklejohn; F. E. Morris, K. N. J. Parsons; H. Pears, D.F.C.; B. Radley; D. Rutherford; E. L. Sims; C. Stanton; D. L. Stevenson, D.F.C.; N. C. Thorne; G. F. Thornton, D.F.C. *Flying Officers:* M. A. Blamey; R. J. T. Buchanan; R. B. Connell, D.F.C.; J. R. Ford; R. Hunter; P. D. Menzies; J. H. Mitchell; E. N. Scott; J. O. Thomas; A. H. Turner.

EQUIPMENT BRANCH

Squadron Leader: C. F. Fairfoot. *Flight Lieutenants:* C. F. Francis; A. H. Gee; T. C. Hart; F. M. Handley; N. W. L. Linton; H. J. D. O'Connell; C. H. Pusey, M.B.E.; D. L. Reeve; A. G. West. *Flying Officers:* W. Baker; W. R. Barber; W. A. Brown; J. S. Cullen; N. H. D. Evans; J. H. B. Ferris; A. J. Godsell; A. Hale, B.E.M.; L. Hanford; S. W. Highley; G. A. Jeffery; L. J. Lockyer; H. G. Mothershaw; R. Wood; F. E. Wooley; A. E. Wright. *Pilot Officers:* S. F. Beeston; A. W. Bolton; G. F. Booth; J. V. Doyle; R. D. Feek; W. W. Felstead; G. W. Goodwin; P. Harris; W. G. Jenkins; B. A. R. King; J. R. Leonard; J. C. Monk; R. E. Morris; D. E. Peters; A. J. Spence; J. Swainston; E. Toole; A. J. H. Wilson; H. R. M. W. Winkler.

SECRETARIAL BRANCH

Flight Lieutenants: W. H. Check, D.F.C.; W. H. Crogham; R. A. Johns; J. McK. Keogh; C. A. Newberry; F. Pichel-Juan, D.F.C.; A. Platts; G. T. G. Richards; J. Robinson; G. H. Taylor; M. H. Vernon; J. S. Wright. *Flying Officers:* R. A. Farrands; H. C. Robinson; E. R. Simons; G. W. J. Walker; H. W. Williams; *Pilot Officers:* A. R. Daw; C. W. Dobson; D. J. W. J. Logan; W. H. Morton.

MEDICAL BRANCH

Squadron Leader: J. A. Wheeler-Bennett, M.R.C.S., L.R.C.P. *Flight Lieutenants:* C. J. W. Souter, M.B., B.S., L.M.S.S.A.; H. Wainstead, B.A., M.R.C.S., L.R.C.P.

CHAPLAINS BRANCH

Church of England: Rev. C. D. Blencoe, B.A.

Roman Catholics: Revs. J. E. W. Connolly; L. Deegan; T. H. Ellis; D. Johnson; J. A. McShane; W. J. McShane, B.D.; P. O'Donoghue; A. G. Prescott.

LECTURERS: Wing Commander Frogley, D.F.C. (right), and S/L. Malins, D.F.C., lecturers attached to the Deputy Directorate of Accident Prevention team, lately returned from a 42,500-mile tour, during which demonstrations were given at 40 R.A.F. stations.

R.A.F. REGIMENT BRANCH

Pilot Officers: P. R. Mayle, E. F. J Yeo.

PROVOST BRANCH

Flight Lieutenants: R. C. Mawer; E. D. Wheeler. *Flying Officer:* J. W. B. Murray. *Pilot Officer:* B. D. Godsell.

PHYSICAL FITNESS BRANCH

Flying Officer: N. Wallbank. *Pilot Officer:* H. Webb.

CATERING BRANCH

Flying Officer: R. G. Preece.

"Perils of the Air . . . ."

"FOR all those who guarded our homes from the manifold perils of the air and won for us the freedom of the skies, thanks be to God." So reads the inscription on a tablet under a Royal Air Force Window in Durham Cathedral which, as already announced, the Duke of Gloucester is to unveil on April 8.

A.T.C. BOXING CHAMPIONSHIPS

IN the Air Training Corps Boxing Championships which took place at the Albert Hall on Friday, March 19th, the Southern champions won eleven of the three-round bouts, and the Northern champions six. The complete results are tabulated below. The Star Silver Wings Trophy, which is awarded to the A.T.C. squadron in the South with the greatest number of winners in the Southern finals, goes to No. 1061 (Southwark) squadron this year, and the equivalent Northern Wings Trophy goes to No. 59 (Huddersfield) Squadron. The Harewood Trophy, which was presented at the Albert Hall by Air Chief Marshal Sir John Slessor, goes to the Welsh Wing in 63 Group for gaining the greatest number of points in the finals. For the best individual performance in the championships and the best loser respectively, the A. J. Elvin Cup was presented to Cdt P. Bourne, No. 556 (Llanelly) Squadron, and the Roy Limbert Cup to his (senior lightweight) opponent, Cdt R. Stone, of No. 238 (Stoke-on-Trent) Squadron. Cadet D. Flack, of Guildford, won the *Flight* Cup.

Cdt D. Flack receives the "Flight" Cup from W/C M. A. Smith, D.F.C.

JUNIORS

Bout	Name	Squadron	Trophy	Presented by
7st Midget ...	Cdt D. Flack	261 Guildford (Southern)	"Flight" Cup	Assistant Editor *Flight*
7st 7lb Mosquito...	Cdt B. Lloyd	1533 Colwyn Bay (Southern)	"Sir Bertram Jones" Cup	Donor
8st Fly Wt ...	Cdt J. North	556 Llanelly (Southern)	"Aeroplane" Trophy	Editor, *The Aeroplane*
8st 7lb Bantam Wt	Cdt A. H. Jones	1223 Caerphilly (Southern)	"Simon Marks" Trophy	Air Marshal A. B. Ellwood
9st Feather Wt ...	Cdt F. King	1061 Southwark (Southern)	"Aeronautics" Cup	Air Marshal Sir L. H. Slatter
9st 7lb Light Wt...	Cdt J. Standring	247 Ashton-under-Lyne (Northern)	"Eland" Cup	F/O. Miles
10st Welter Wt ...	Cdt J. Lewis	1061 Southwark (Southern)	"Chamier" Cup	A. Cdre. Sir J. A Chamier
10st 7lb Middle Wt	Cdt J. B. Bennett	370 Sheffield (Northern)	"Bailey" Cup	Air Marshal Sir Brian Baker
11st Heavy Wt ...	Cdt F. Davenport	235 Stoke-on-Trent (Northern)	"Lord Londonderry" Cup	Air Marshal Sir Alan Lees
		SENIORS		
8st Fly Wt ...	Cdt A. C. H. Smith	1223 Caerphilly (Southern)	"Lawley" Cup	G/C. G. H. Lawley
8st 6lb Bantam Wt	Cdt/Cpl A. Smith	1938 Salford (Northern)	"Lord Glendyne" Trophy	Rev J. F. Cox
9st Feather Wt ...	Cdt J. Corcoran	59 Huddersfield (Northern)	"Duncan Smith" Trophy	A. V-M. P. C. Livingstone
9st 9lb Light Wt ...	Cdt P. Bourne	556 Llanelly (Southern)	"Air Reserve" Trophy	Editor, *Air Reserve Gazette*
10st 7lb Welter Wt	Cdt R. King	1061 Southwark (Southern)	"Hilary" Cup	Air Marshal Sir R. A. Cochrane
11st 6lb Middle Wt	Cdt/Cpl K. Millson	103 Doncaster (Northern)	"Arthur Mach" Cup	P/O. Ross (Past A.T.C. Champion)
12st 7lb Lt Hvy Wt	Cdt D. Weale	1340 Colwyn Bay (Southern)	"Sir Harry Price" Cup	Right Rev. Mgnr. H. Beauchamp
Heavy Wt ...	Cdt W. Goodair	1061 Southwark (Southern)	"Robert Strauss" Trophy	Air Marshal Sir Hugh Saunders

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THOSE ADJECTIVES

Supersonic, Super-audible and Ultrasonic

I AM afraid that all those who are considering the problem of ' supersonic aircraft" will strongly resent the assumption made by Mr. Sansom in his letter in your issue of March 11th, that workers in the field of ultra-high frequency sound waves have a prior claim to the word "supersonic." The actual priority of date may be difficult to establish, but the application of the adjective supersonic to speeds faster than sound is certainly of many years standing and is too well established to be changed. Mr. Sansom himself uses the word super-audible, which would appear to be more appropriate than supersonic. Another suggestion for avoiding confusion is to use the adjective ultrasonic for high-frequency waves, reserving supersonic for speeds faster than sound.

N.P.L., Teddington. C. N. H. LOCK.

THE R.A.F.V.R.

Question of Leave the Stumbling Block

OF the points raised in recent letters regarding R.A.F.V.R. recruiting two potent ones appear to have been missed.

When the "V.R." was first brought into being in 1937, no campaign was needed to attract recruits—I do not remember seeing an advertisement—one was just lucky to be accepted from all those applying.

At the time I was an employee of a sympathetic firm (to the extent that I was allowed to take unpaid leave) and now as an employer I am sure that the biggest single obstacle to recruitment must be the difficulty, under present conditions, in obtaining or giving leave for the annual training which forms such an essential part of the scheme. H. C. BARSON.

Upper Norwood, London, S.E.19.

The Views of an Instructor

I WOULD like to endorse and add to "Ex-R.A.F.'s" letter re the R.A.F.V.R. in *Flight* of March 18th.

I was a member of the R.A.F.V.R. pre-war. We were equipped with Harts and Hinds, and only the outbreak of war stopped the arrival of Battles, which were then front-line aircraft.

Although requirements change, I also am disappointed that we only have Tiger Moths to fly in the V.R. The Tiger is a very fine aircraft, in fact I am instructing on them and never get tired of flying them, but it is not to be wondered at that recruiting for the V.R. is slow when we read of the R.N.V.R. flying Spitfires and yet also hear that staff pilots will be employed to fly Ansons when training starts for V.R. navigators and radio operators.

As "Ex-R.A.F." says, one can fly elementary types at the local club (although this depends on one's pocket). Surely it is not asking too much for at least a couple of Harvards and Oxfords at each V.R. school for advanced flying exercises and radio practices. H. D. R.

Portsmouth.

A Plea for the National Service Man

I HAVE read all the recent correspondence on the R.A.F.V.R., and I was especially interested in the letter from "Reservist" (March 11th), who suggested that pilots should be accepted for training *ab initio*.

There are many young men who, while unwilling to sign on for five years' regular service in the R.A.F., are anxious to fly, and who would be ready to serve in the event of an emergency. However, they have no chance whatsoever of learning to fly, as there is no Civil Air Guard, the R.A.F.V.R. is closed to them, and very few are able to afford to train at flying clubs.

If National Service is to continue, there is no reason why a man serving his two years in a ground trade should not be able to become a member of the V.R. and fly at week-ends. The knowledge gained in his trade, especially if one connected with aircraft, such as flight mechanic engines or airframes, would enable him to understand his aircraft and make him treat it with more respect in the air than otherwise might be the case

Unless something is done to enable young men to fly, all the best of them will join one of the other Services, since conditions as they stand at present are more favourable. An intelligent man has the opportunity of obtaining a commission within a few months of joining the Army, whereas by serving his National Service period in the R.A.F. he has little or no hope of promotion. The answer lies in the R.A.F.V.R.

Windsor, Berks. DAVID F. OGILVY.

IS THE TUDOR GOOD OR BAD?

The Answer is "Good"

IN the article entitled "More About Tudors" in the March 11th edition, you say in the second paragraph "Most ordinary people . . would still rather like to ask 'Are Tudors good or bad: who has the ability to judge, and has anyone the authority to do anything about it one way or another?'"

As regards the first question, this is a fair query. As regards the second question, one would have thought that the pilots who have flown Tudors on operational service have the ability to judge whether the Tudor is good or bad, and it is surprising that the author of the article has done nothing to find out whether Tudors are good or bad beyond addressing a quasi-rhetorical question to the world at large.

The pilots of British South American Airways Corporation, of whom I am one, have been longing to be asked their views on the Tudor, and I relish this opportunity of replying on their behalf.

Our answer is decidedly "The Tudor is good." During the few months we operated them on our Caribbean service we enjoyed flying them immensely. There were, of course, a few snags encountered in the aircraft, but then has there been an aircraft that has been free from fault from the time it first flew operationally? I doubt it! And I would point out to those apparently short-memoried champions of the Constellation that *it* was grounded for a time after commencing operational service.

We are extremely sorry about the operational hold-up of Tudors, and are looking forward to seeing them back in service again. This statement is not prompted by any nationalistic interest in the British aviation industry—we just like operating in the aircraft.

It it is remembered that the Tudor was produced under extremely difficult conditions, it must be considered a successful civil aircraft, and if the British industry can produce aircraft of new design as good by comparison with the easier conditions available, then the industry can look forward with confidence to the future. R. C. ALABASTER.

Sudbury, Middlesex.

FORTHCOMING EVENTS

Apr. 1st.—R.Ae.S. (Manchester): "Flight Refuelling." C. H. Latimer Needham.
Apr. 1st.—R.Ae.S. (Yeovil): A.G.M. and Films.
Apr. 3rd.—Helicopter Association of Gt. Britain: "Some Technical Aspects of W9 Developments." J. S. Shapiro, A.F.R.Ae.S.
Apr. 3rd.—Rugby Football. R.A.F. versus Army, Twickenham.
Apr. 5th.—R.Ae.S. (Derby) "Flight Refuelling." Sir Alan Cobham, K.B.E., A.F.C.
Apr. 7th.—R.Ae.S. (Gloucester and Cheltenham): A.G.M. and Films.
Apr. 7th.—R.Ae.S. (Luton): "Rocket Propulsion and Interplanetary Flight," A. V. Cleaver, A.F.R.Ae.S.
Apr. 14th.—R.Ae.S. (Graduates and Students): "The Influence of the Recent Civil Airworthiness Requirements on Civil Aircraft Design." W. Tye, B.Sc., F.R.Ae.S.
Apr. 14th.—R.Ae.S. (Bristol): A.G.M. and Films.
Apr. 15th.—Royal Aeronautical Society: "Visual Aids for Low visibility Conditions," E. S. Calvert, B.Sc., A.R.C. Sc.I.
Apr. 16th.—British Interplanetary Society: "High Strength Hydrogen Peroxide for Rocket Propulsion." V. W. Slater, B.Sc., F.R.I.C., M.I.Chem.I., and W. S. Wood, B.Sc., F.R.I.C., A.M.I.Chem.E.
Apr. 16th.—Institute of Navigation: "The Future of the Magnetic Compass." Cdr. W. E. May, R.N.
Apr. 30th.—United Flying Clubs Ball, The Dorchester, Park Lane.
May 5th.—British Interplanetary Society: "Lunar Research." H. P. Wilkins, F.R.Ae.S.
May 11th.—R.Ae.S. (Graduates and Students): "The Light Aeroplane and the Future of Private Flying." P. G. Masefield M.A., F.R.Ae.S.
May 17th.—Cannes International Air Rally.
May 19th to 28th.—Engineering and Industrial Equipment (Home and Export) Exhibition.
May 21st.—Institute of Navigation: "Meteorology in Aviation: Is it Obsolete?" Francis Chichester.
May 22nd and 23rd.—Shannon Aero Club Rally.
May 24th to 29th.—Aircraft Exhibition, Cardiff.
May 27th.—Royal Aeronautical Society: Wilbur Wright Memorial Lecture. A. Gouge, B.Sc., F.R.Ae.S.

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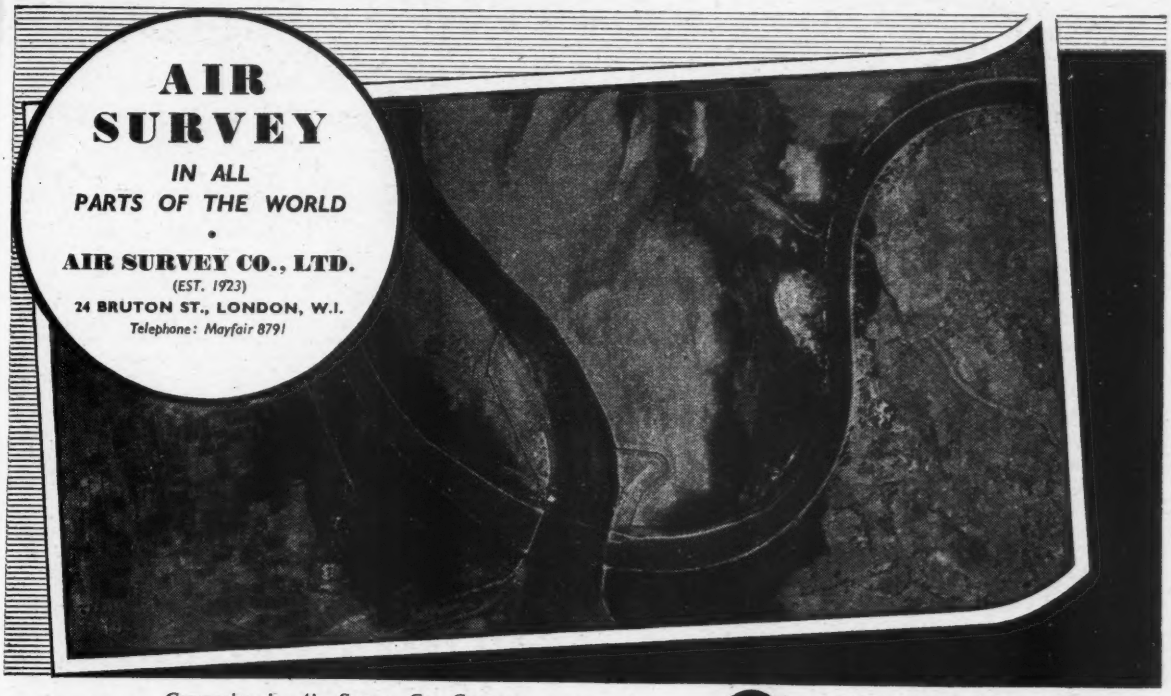

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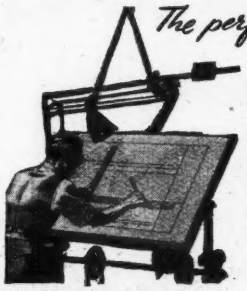

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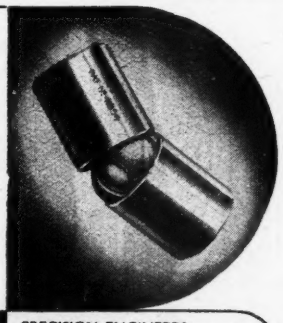

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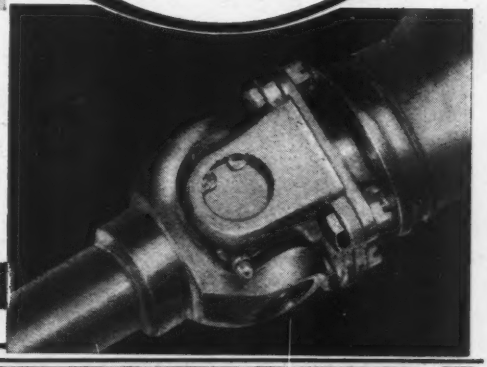

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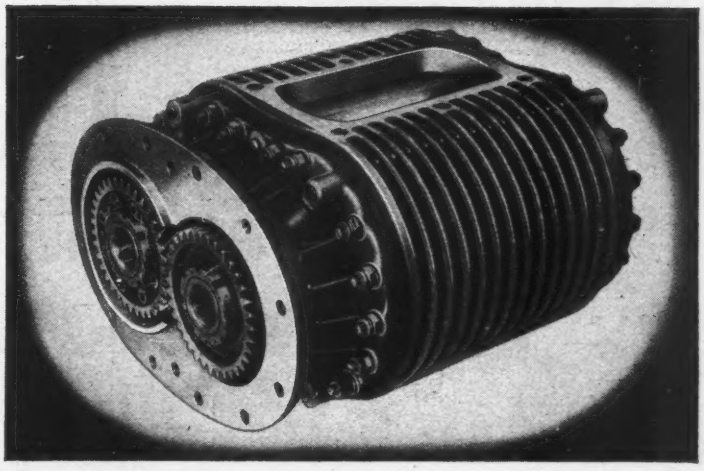

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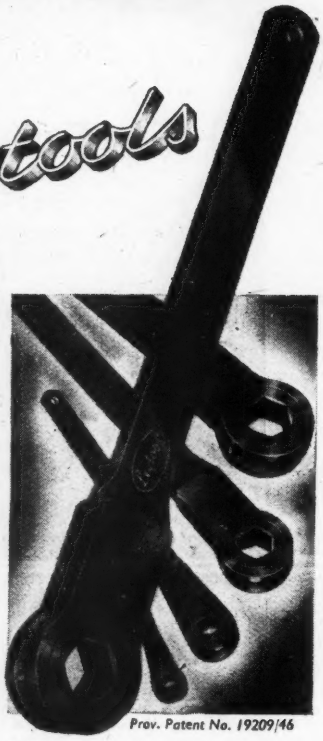

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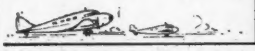

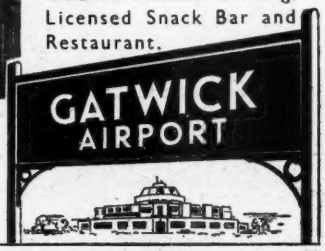

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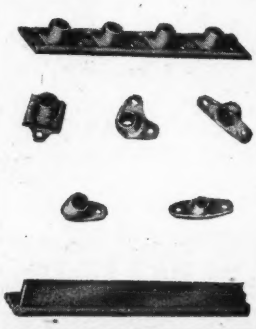

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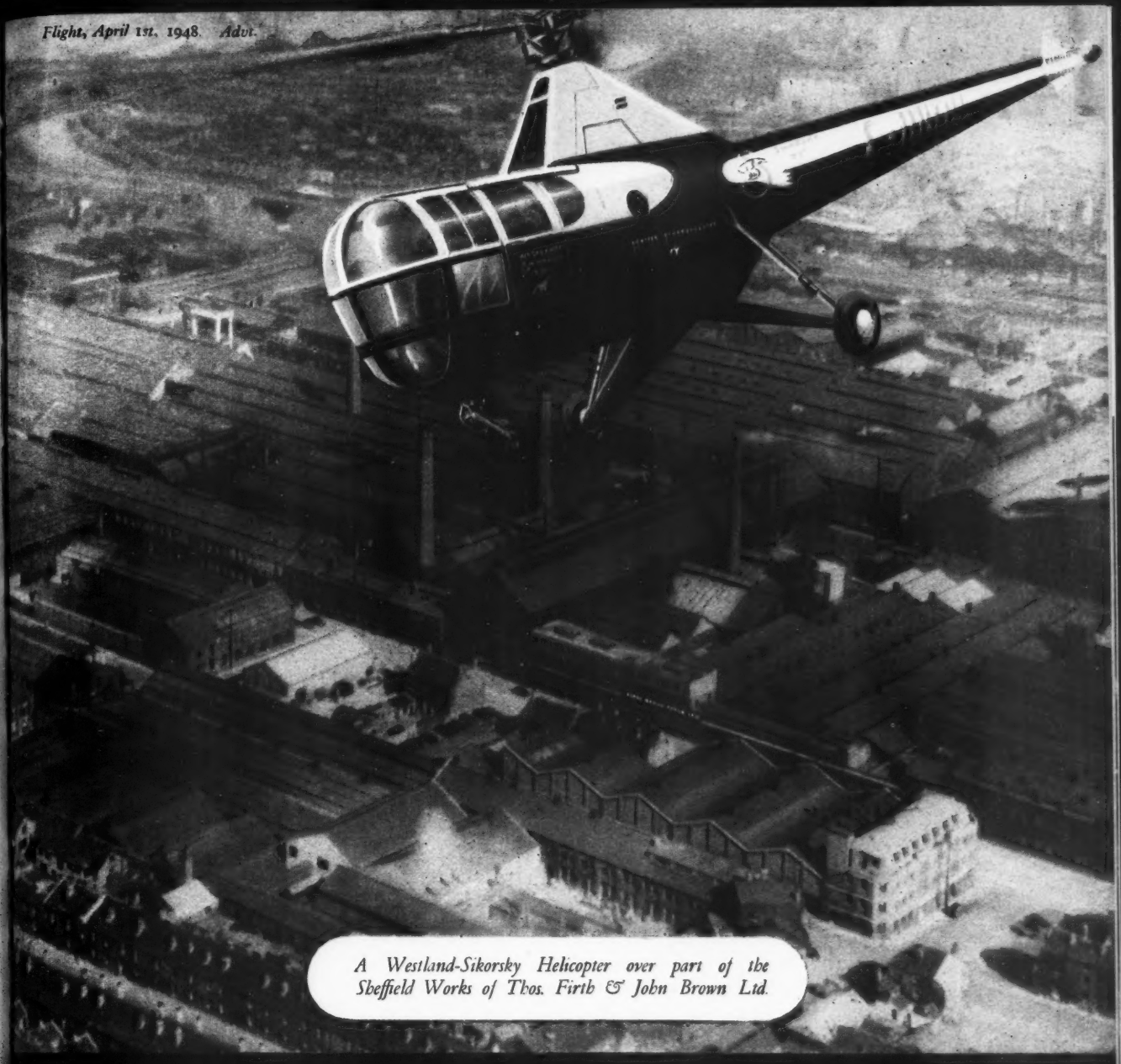

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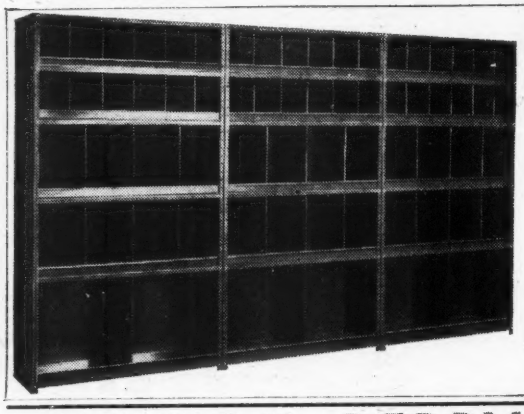

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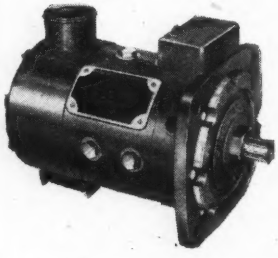

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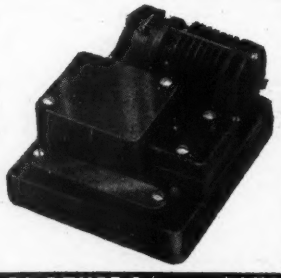

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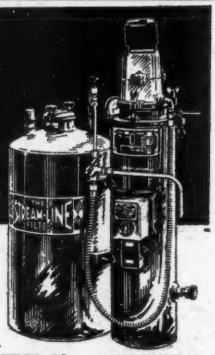

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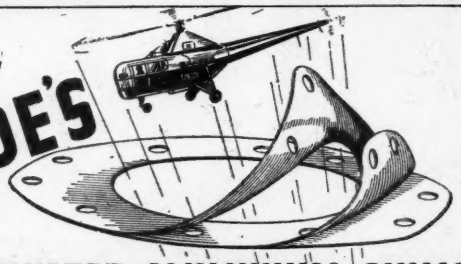

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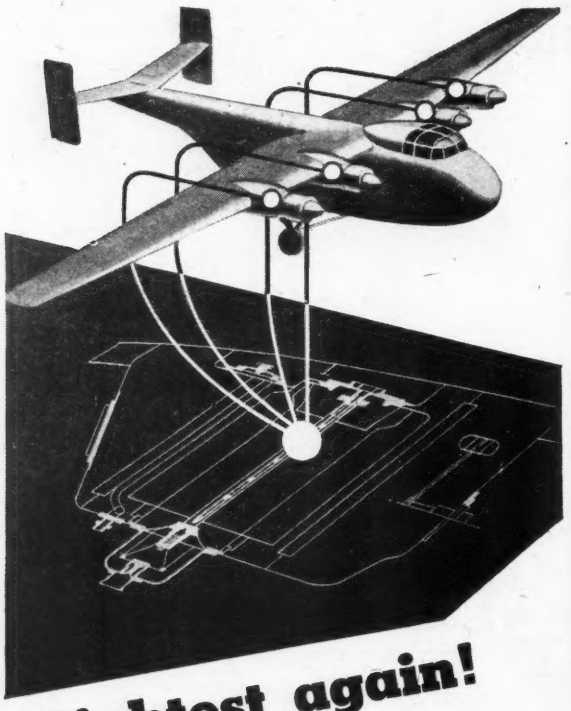

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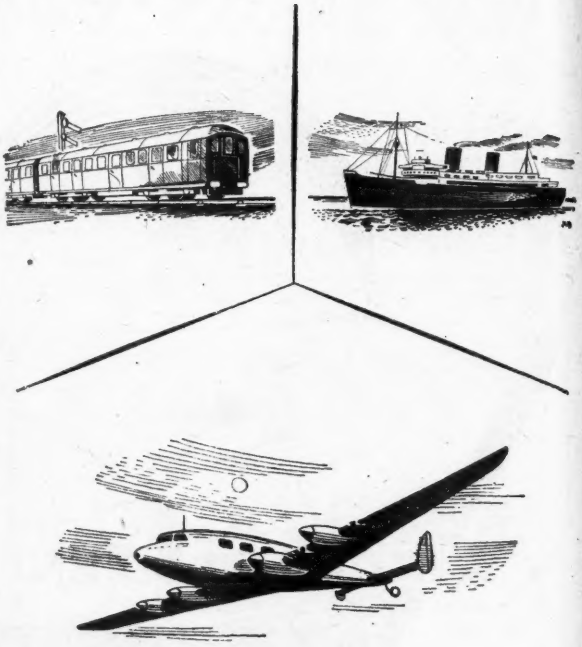

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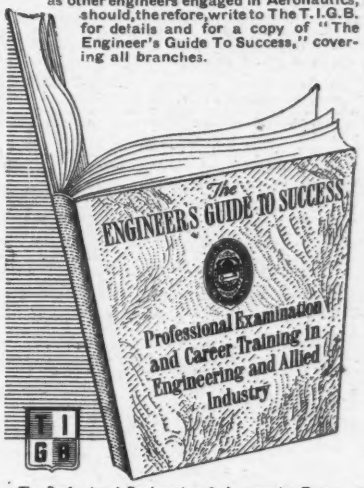
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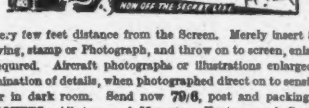

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